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USSR Report

CHEMISTRY

No. 74

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On behalf of all of us in FBIS I wish to express appreciation to our readers who have guided our efforts throughout the years.

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BIOCHEMISTRY

UDC 541.13

BIOELECTROCATALYSIS - ACTIVATION OF THE HYDROGEN REACTION BY IMMOBILIZED HYDROGENASE

Moscow ELEKTROKHIMIYA in Russian No 6, 1980 pp 763-767 submitted 14 Jun 79

BOGDANOVASKAYA, V. A., VARFOLOMEYEV, S. D., TARASEVICH, M. R., and YAROPOLOV, A.I., USSR Academy of Sciences Institute of Electrochemistry, Moscow State University imeni M. V. Lomonosov

[Abstract] A proposed adsorption method of immobilization of hydrogenase on carbon black is described and results of the study of anode oxidation and cathode liberation of hydrogen at the electrodes with immobilized hydrogenase are discussed. The study involved the use of hydrogenase liberated from Pr.aestuarii or T. roseopersicina with carbon black PM-100 as carrier. The study showed that immobilized hydrogenase provides an anode hydrogen oxidation reaction which is nearly reversible. The enzyme is stable in neutral solutions at 20-40° C. The amount of current generated under these conditions depends upon the activity of the initial hydrogenase and the electrode surface filled by it. References: 8; Figures: 5.
[227-2791]

UDC 541.64:543.422.27

ELECTRON PARAMAGNETIC RESONANCE STUDY OF CHANGES IN PLASMA PROTEIN STRUCTURE DURING ADSORPTION

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian No 9, 1980 pp 2143-2148 manuscript received 20 Sep 79

ZIMINA, L. A., IORDANSKIY, A. L., POLISHCHUK, A. Ya., GRIGORYAN, G. L., MOISEYEV, Yu. V. and ZAIKOV, G. Ye., Institute of Chemical Physics, USSR Academy of Sciences

[Abstract] Adsorption of plasma proteins on the surface of synthetic materials is a complex process involving changes in the secondary and tertiary structure of protein globules and is the first step in thrombus formation. Structural changes in human gamma-globulin were studied during adsorption on silica gel

SG-3 (hydrophilic surface) and high density polyethylene (PE) (hydrophobic surface). Globulin was labeled with cyanuric chloride. EPR spectra of PE--gamma-globulin systems were taken in the protein concentration range of 0.5-2%, at which maximum protein concentration on the polymer surface is reached. EPR spectrum of the adsorbed spin-labeled proteins was characterized by the superimposition of two different spectra, indicating the existence of different microenvironments created by changes in the structure of the protein on the surface in comparison with its structure in the aqueous solution. The two typical spin-label frequencies of adsorbed gamma-globulin were determined by two types of protein attachment to the surface. The type of adsorbent surface determines the ratio of reversibly and irreversibly adsorbed protein. During transition from the hydrophilic silica gel to the more hydrophobic PE, the proportion of rigidly bound protein decreases and correlation time increases. The correlation between the two adsorption types on the adsorbent surface and the intensity of interaction with the surface may also describe a material's thromboresistance. Thrombus formation will proceed less vigorously on a PE surface than on silica gel. Figures 3; tables 1; references 25: 13 Russian, 12 Western.
[09-9307]

UDC 541.64:577.15

EFFECT OF METHODS FOR PROTEOLYTIC ENZYME IMMOBILIZATION IN POLYMER HYDROGELS ON BLOOD COMPATIBILITY OF MODIFIED POLYMER MATERIALS

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian No 9, 1980 pp 1963-1972
manuscript received 10 Jul 79

PLATE, N. A., VALUYEV, L. I. and CHUPOV, V. V., Moscow State University imeni M. V. Lomonosov

[Abstract] A promising method for increasing blood compatibility of polymers used in synthetic blood vessels and organs is the modification of their surface by enzymes affecting thrombus formation [illegible] fibrinolysis. The first modification of the polymer surface (polyethylene, polypropylene and lavsan [polyethylene terephthalate]) was the introduction of primary amino groups by gamma-irradiation-induced graft copolymerization of allylamine, followed by treatment of the graft copolymer with glutaraldehyde and the enzyme solution. Enzymes used were fibrinolysin and Actinomyces spheroides protease. Enzyme activity increased at higher radiation doses, but physicochemical properties deteriorated. This deterioration was eliminated by the use of phosphoric acid as an allylamine radical homopolymerization activator. Activity of protease on a film obtained by graft copolymerization in the presence of 70% phosphoric acid and irradiated with 1 Mrad was 3.2-3.5 μg of tyrosine/min·10 cm^2 versus 1.0-2.1 μg of tyrosine/min·10 cm^2 for similar samples prepared without phosphoric acid and irradiated with 60 Mrad. This means of enzyme modification is suitable for polymer products exposed to blood for a short time (several hours). The polymers with immobilized enzymes may be stored at room temperature for a relatively long time. The second method for modifying polymers with immobilized enzymes was the grafting of an enzyme

with active C=C bonds onto the polymer surface. This reaction was carried out by acylation of the enzyme by anhydrides or halogen anhydrides of suitable acids either at the terminal NH_2 groups of lysine NH_2 groups. This method was tested with protease, fibrinolysin and bovine alpha-chymotrypsin and trypsin. Acylation did not reduce enzyme activity and increased trypsin and alpha-chymotrypsin activity. The acylated enzyme was immobilized on the polymer by gamma-irradiation, which also sterilized the material. Graft polymerization of only an acylated enzyme produced samples with low activity, irregular distribution of the grafted enzyme and insufficient hydrophilic properties. These deficiencies were eliminated by combined graft copolymerization of an activated enzyme and hydrophilic comonomer (acrylamide) on the polymer surface. Blood compatibility increased because of the formation of a hydrophilic layer on the polymer surface. After irradiation (about 3 Mrad), the acylated protease lost its general proteolytic activity but retained about 30% of its fibrinolytic activity. Comparison of the two modifications showed that at identical radiation doses the activity of the acylated enzymes and acrylamide grafted onto the polymer surface was almost two orders of magnitude higher than that of the allylamine grafted copolymers. The acylated enzyme--acrylamide modification was also more stable, retaining up to 50% of its activity for 17 days. Both modifications increased blood compatibility. Figures 6; tables 4; references 23: 11 Russian, 12 Western.
[09-9307]

UDC 543.866

IMMOBILIZED ENZYMES AND PROSPECTS FOR THEIR USE

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IMENI D. I. MENDELEYEVA in Russian No 5, 1980 pp 581-588

BEREZIN, I. V., corresponding member, USSR Academy of Sciences, YEGOROV, A. M., OSIPOV, A. P. and OSIPOVA, T. A., Faculty of Chemistry, Moscow State University

[Abstract] Enzymes have been used preferentially as industrial catalysts because of their high efficiency and specificity. Advances in this area have proceeded from simple hydrolytic enzymes through immobilized enzymes and immobilized enzymes plus cofactors to multienzymatic systems capable of complex transformations. This review discusses the use of immobilized enzymes in the production of glucose and gluconic acid, in beer, stabilized wine and juice production, in enzymatic cellulose hydrolysis and in the production of ethanol and single-cell protein. In medicine, enzymes have been applied in the prevention of atherosclerosis and thrombosis, in organ-specific transport of drugs with the use of enzyme-containing liposomes, in artificial organs, in diagnosis and in control of chemotherapy efficacy. Enzymes are also used in the determination of physiologically active substances (e.g. luciferase), in enzyme electrodes and in direct competitive and homogeneous immunoenzymatic analysis, which has been introduced into the diagnosis of infectious diseases. Enzymes have also been studied in relation to bioconversion of solar energy by photosynthesis into electricity or liquid or gaseous fuel, the production of hydrogen from alcohol and methanol and electrochemistry.

Enzymes also act as bioorganic catalysts in the organic synthesis of amino acids and antibiotics and in the enzymatic transformation of steroids and have also found application in the synthesis of acid-containing compounds. Figures 3; tables 1; references 30: 16 Russian, 14 Western.
[10-9307]

UDC 541.128.1+577.150.2

ENZYME CATALYZED PEPTIDE SYNTHESIS IN A TWO-PHASE AQUEOUS-ORGANIC SYSTEM

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 254, No 1, Sep-Oct 80 pp 121-123 manuscript received 26 Dec 79

MARTINEK, K., SEMENOV, A. N. and BEREZIN, I. V., corresponding member, USSR Academy of Sciences, Moscow State University imeni M. V. Lomonsov

[Abstract] To demonstrate the possibility of increasing enzyme yield in a two-phase system, the synthesis of N-acetyl-L-tryptophanyl-L-leucinamide using alpha-chymotrypsin was carried out in an ethyl acetate-aqueous buffer solvent. The equilibrium constant of the reaction is a thousand-fold greater in water containing 2% ethyl acetate than in water. This is due to extraction of nonionized reactant and final product out of the aqueous phase. Quantitative yields were achieved. This method of increasing yield is superior to product precipitation, to use of large quantities of organic solvents or to the use of activated ester reagents. Figures 1; references 15: 6 Russian, 9 Western.
[03-12126]

FERTILIZERS

UDC [631.83+631.85]:631.452

REGULATION OF THE PHOSPHORUS AND POTASIUM LEVEL IN DIFFERENT SOILS BY INTENSIVE USE OF FERTILIZERS

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 6, 1980 signed to press
27 May 80 pp 14-19

POSTNIKOV, A. V., candidate of agricultural sciences, SHAFRAN, S. A., candidate of agricultural sciences, All-Union Scientific Research, Planning and Technological Institute of Chemistry

[Abstract] An analytical review of the literature is used in a discussion of the expenditure of phosphorus and potassium fertilizers required to increase nutrient elements in soils of different types, mechanical composition and humus content. Results of annual applications and emergency applications of fertilizers are discussed and compared. References: 48: 43 Russian, 5 Western.
[278-2791]

UDC [571/.5]:631.8

THE USE OF FERTILIZERS AND NUTRIENTS BALANCE IN AGRICULTURE OF SIBERIA

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 6, 1980 signed to press
27 May 80 pp 9-13

ZHUKOV, G. A., candidate of agricultural sciences

[Abstract] Yields of grain, potato and vegetable crops for the 1961-1965 and 1971-1975 periods for regions of Siberia in comparison with those for the RSFSR are presented in tables and discussed in respect to the use of mineral fertilizers in Siberia. The nutrients balance in Siberian agriculture for 1961-1965, 1971-1975 and 1976-1977 are tabulated and discussed. These data indicate the need for increased use of mineral fertilizer in Siberia with consideration of the needs of various regions of the country. The use of mineral fertilizers must be accompanied by due concern for environmental issues. References: 2 Russian.
[228-2791]

UDC 631.85

COMPLEX LIQUID FERTILIZERS BASED ON AMMONIATION OF A POLYPHOSPHORIC-NITRIC ACID MIXTURE

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian No 9, 1980 pp 1934-1938 manuscript received 26 Mar 79

BEGLOV, B. M., DZHURAYEV, F. Kh. and KAMALOV, K. M., Institute of Chemistry, Uzbek Academy of Sciences

[Abstract] Previously obtained complex liquid fertilizers were deficient because of an unbalanced N:P ratio or high crystallization point. A balanced (20-20-0) complex liquid fertilizer was obtained by continuous neutralization by anhydrous gaseous ammonia of a mixture of thermic polyphosphoric acid (77.6 wt.% $P_2O_{5\,general}$, 30.0 wt% $P_2O_{5\,ortho}$, 33.9 wt.% $P_2O_{5\,pyro}$, 9.4 wt.% $P_2O_{5\,tripoly}$, and 4.4 at.% $P_2O_{5\,tetrapoly}$) and 56.2% nitric acid. Optimal neutralization temperature was 82-85° C; a pronounced increase in rate of P_2O_5-polyform hydrolysis occurred above 85° C. Increase in fertilizer pH slightly reduced the rate of P_2O_5 polyform hydrolysis. Clear, homogeneous liquid fertilizers were obtained by neutralizing the acid mixture of pH 6.0; an increase in pH to 6.2 or higher resulted in the precipitation of ammonium orthophosphate. The fertilizer had a low crystallization point, a hydroscopic point of 64-67% at pH 5-6 and satisfactory density, viscosity and specific electric conductivity. No changes in consistency or composition were noted after a 6-month storage in closed containers. Figures 1; tables 2; references 11: 9 Russian, 2 Western.
[12-9307]

UDC 621.039.542

CHEMICAL PROCESSES FOR PREPARING MATERIALS FOR NUCLEAR FUEL

Leningrad RADIOKHIMIYA in Russian No 3, 1980 signed to press 26 May 80 pp 305-315
submitted 26 Jun 79

FILIPPOV, Ye. A., PAPKOV, A. S., and KOKORIN, I. I.

[Abstract] A discussion of the present state and the development of chemical methods used to prepare materials for nuclear fuels emphasizes the great prospects in extraction and sorption processes. Different schemes of sol-gel processes, methods for preparing sols of metals, and methods for preparing microspherical fuel particles by pyrolysis of saturated granulated ionites are described. It is assumed that chemical methods of producing nuclear fuel for modern closed fuel cycles will be of decisive importance in the future. References: 32; Figures: 5.
[229-2791]

ION EXCHANGE PHENOMENA

UDC 541.183.5

SORPTION OF URANIUM FROM CARBONATE-CONTAINING SEA WATER TYPE SOLUTIONS BY NEW ORGANOPHOSPHORUS IONITES

Leningrad RADIOKHIMIYA in Russian No 3, 1980 signed to press 26 May 80 pp 336-342
submitted 25 Jan 79

NOVIKOV, Yu. P., MIKHEYEVA, M. N., MYASOYEDOV, B. F., AKHMANOVA, M. V., and KOMAREVSKIY, V. M.

[Abstract] The sorption capacity of some new ionites, prepared by introduction into the polymer shell of chelatogenic groups containing P and N atoms (ethylenediaminoalkylphosphonic, hydroxy and aminoalkylphosphonic and other groups , was studied in respect to uranium sorption. The kinetic characteristics of the sorption process and the exchange capacity of the ionites are discussed. The rate constants and magnitudes of activation energy of the reaction for the 3 groups were calculated and compared. Evaluation of the heat of reaction of the uranyl ion with the sorbents (42-47 KJoules/mole) showed that they greatly exceeded the heats of ion-exchange reactions, which indicates chemical interaction of the uranyl ion with the phosphonate groups of the collector to form compounds of low solubility. Infra-red spectroscopic study of the sorption products indicates that sorption was accompanied by decomposition of the complex anion $[UO_2(CO_3)_3]$ and addition of UO_2^{2+} to the phosphate groups of the ionite. References: 11; Figures: 4.
[229-2791]

ORGANOMETALLIC COMPOUNDS

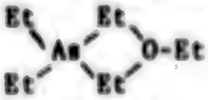
UDC 536.7:547.242:272.1

THERMODYNAMIC STUDY OF THE TRIETHYLARSINE-DIETHYL ETHER SYSTEM

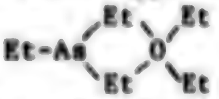
Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 50, No 9, Sep 80 pp 1931-1937
manuscript received 11 Nov 79

BAYEV, A. K., SILIVANCHIK, I. P. and KOZYRKIN, B. I., Belorussian Technological Institute imeni S. M. Kirov

[Abstract] Many synthetic methods for the production of $AsEt_3$ require the presence of Et_2O in the system. Therefore, it was of interest to study the $AsEt_3$-Et_2O system in order to develop separation methods for isolating pure $AsEt_3$. The total heat of evaporation expressed as a function of the solution's composition showed a distinct minimum at 20-25 mole-percent of Et_2O, indicating an interaction among the components of this solution. A complex formation of a mixed dimer type has been postulated in the system $AsEt_3$-Et_2O:



(I) or



(II).

Because of the electronic configuration of the As and O atoms and their ethyl groups, only monomers of Et_2O and $AsEt_3$ molecules exist in these complexes in the vapor state. The complex formation in such a system is possible because of the differences in electronegativity of As and O, leading to the formation of the As-Et-O bridge. The I structure of the complex is believed to be more realistic that II. Figures 4, references: 4 Russian.
[14-7813]

UDC 547.242

SYNTHESIS OF BIS(DIARYLARSINO)METHANES AND THEIR DERIVATIVES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian No 6, 1980 pp 1329-1333 manuscript received 15 Oct 79

CHERNOKAL'SKIY, B. D. and GARIYEVA, F. R., Kazan' Chemico-Technological Institute imeni S. M. Kirov

[Abstract] Phenylsubstituted derivatives of ditertiary arsines have previously been relatively uninvestigated. In this connection, it was of interest to synthesize

certain of these derivatives and explore the effect of substitutents at the phenyl residue on the properties of the compounds. Synthesis of bis(diarylarsino)methanes was accomplished by reaction of the corresponding organomagnesium compounds with bis(dichloroarsino)methane in tetrahydrofurane. The resulting bis(diarylarsino)methanes are colorless crystalline substances resistant to air oxygen as well as moisture at room temperature and upon recrystallization. In view of this, it was of interest to investigate their interaction with aqueous hydrogen peroxide and sulfur. The oxidation of bis(diarylarsino)methanes was conducted in acetone with a slight excess of 30% hydrogen peroxide. The resulting bis(diarylarsino)methane dioxides and disulfides were isolated with satisfactory yields. This indicates comparatively high strength in the arsenic-carbon bond. References 4:
2 Russian, 2 Western.
[207-1386]

ORGANOPHOSPHORUS COMPOUNDS

UDC 547.79+547.341

AZLACTONE OF 2,2-DICHLORO-1-BENZOYLAMINOVINYLPHOSPHONIC ACID CHLORIDE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 50, No 9, Sep 80 pp 2142-2143
manuscript received 22 Apr 80

LOBANOV, O. P. and DRACH, [illegible]. S., Institute of Organic Chemistry, UkSSR Academy of Sciences

[Abstract] A mixture of the diethyl ester of 2,2-dichloro-1-benzoylaminovinylphosphonic acid and PCl_5 reacted exothermally. The reaction mixture was refluxed for an additional 4-5 hrs to yield the azlactone of 2,2-dichloro-1-benzoylaminovinylphosphonic acid chloride, b. p. 148-150°C/0.02 mm Hg, m.p. 104-106° C, which upon reaction with PCl_5 gave 1,4,4-trichloro-1-phenyl-3-dichlorophosphonyl-2-aza-1,3-butadiene, b.p. 119-121°C/0.02 mm Hg, d_4^{20}1·5635, n_D^{20} 1·6.230. References: 4 Russian.
[14-7813]

UDC 547.241+541.127

KINETICS OF THE ALKALINE HYDROLYSIS OF m,p-SUBSTITUTED PHENYL ESTERS OF DIPHENYLPHOSPHINOUS ACID IN WATER AND AQUEOUS ETHANOL

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 50, No 9, Sep 80 pp 2141-2143
manuscript received 6 Mar 80

SUKHORUKOVA, N. A., ISTOMIN, B. I. and KALABINA, A. V., Irkutsk State University imeni A. A. Zhdanov

[Abstract] Bimolecular constants K_2 of alkaline hydrolysis for a series of phosphinates $Ph_2P(O)OC_6H_4X$ were studied in water and in 50 and 90 percent aqueous ethanol at 25° C. Hydrolysis of all of these compounds decreases with an increase of ethanol concentration to 50 percent and then remains practically unchanged. The rate constants for a number of substituents X have been reported for water, 50 percent ethanol and 90 percent ethanol. They are: p-NO_2, 22.95±0.31, 5.22±0.08, 5.24±0.12; m-Br, 4.23±0.13, 0.494±0.005, 0.457±0.041; p-Br, 2.94±0.06, 0.416±0.11, 0.275±0.056; H, 1.30±0.01, 0.88±0.001, 0.053±0.001; p-CH_3, 0.727±0.003, 0.0435±0.002,-. References: 5 Russian.
[14-7813]

UDC 547.455.62.118

SYNTHESIS OF 2,3,4,6-TETRA-O-ACYL-β-D-GLUCOPYRANOSYL-1-PHOSPHATES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 50, No 9, Sep 80 pp 2140-2141
manuscript received 14 Mar 80

VOYTENKO, A. V., VOLKOVA, L. V. and YEVSTIGNEYEVA, R. P., Moscow Institute of Fine Chemical Technology imeni M. V. Lomonosov

[Abstract] In an attempt to get new antitumor agents, synthesis of 2,3,4,6-tetra-O-acyl-β-D-glucopyranosyl-1-phosphates was undertaken. Reaction of 1-bromo-2,3,4,6-tetra-O-acyl-β-D-glucopyranose with silver dibenzylphosphate gave 2,3,4,6-tetra-O-acyl-β-D-glucopyranosyl-1-dibenzylphosphate. Catalytic hydrogenation of the latter gave the disodium salt of 2,3,4,6-tetra-O-acyl-β-D-glucopyranosyl-1-phosphate. The products showed no antitumor activity. References 5: 1 Russian, 4 Western.
[14-7813]

UDC 547.241+541.127

SIMILAR EFFECTS OF STRUCTURAL FACTORS ON SOME PROCESSES TAKING PLACE AT THE PHOSPHORYL AND CARBONYL GROUPS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian, Vol 50, No 9, Sep 80 pp 2138-2139
manuscript received 4 Mar 80

ISTOMIN, B. I., BARANSKIY, V. A. and SUKHORUKOV, Yu. I., Institute of Petro- and Coal-chemical Synthesis at Irkutsk University imeni A. A. Zhdanov

[Abstract] The mechanisms of many reactions involving carbonyl groups have been thoroughly studied. An attempt was made to analyze factors which affect processes taking place on the phosphoryl groups in correlation to carbonyl groups. The following aspects were analyzed: 1)effect of substituents on pK_a in acids XYP(O)OH and XCOOH; 2) structure and acid moiety of the departing group on alkaline hydrolysis $Ar_2P(O)OEt$ and ArC(O)OEt, as well as $X_2P(O)OAr$ or $X_2P(S)OAr$ and XC(O)OAr; and 3) the structure of attacking nucleophile in substitution reactions at the phosphoryl and carbonyl groups. It was discovered that the interaction of substituents with $\equiv P(O)$ and with $=C(O)$ groups was qualitatively identical. References 5: 3 Russian, 2 Western.
[14-7813]

UDC 547.241+547.33

REACTION OF TRIETHYLPHOSPHITE WITH 1-α-FURYL-2-NITROETHYLENE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 50, No 9, Sep 80 pp 2137-2138
manuscript received 27 Mar 80

VAFINA, N. M. and SHERMERGORN, I. M., Kazan' Veterinary Institute imeni N. E. Bauman

[Abstract] The reaction of triethylphosphite with 1-α-furyl-2-nitroethylene was carried out in acetic and propionic acids, using a 10:1 ratio of phosphite:nitroolefine. Low boiling products and two high boiling fractions were obtained in both acids. The fraction boiling at 130° C/0.05mm Hg consisted of 1,2-bis(diethoxyphosphinyl)-1-α-furylethane, n_D^{20} 1.4678, d_4^{20} 1.1756. The products distilling at 100° C/0.015 mm Hg were different. In propionic acid the product was C-diethoxyphosphinylformaldoxime, while in acetic acid diethyl(α-diethylphosphone)ethylphosphate was obtained, b. p. 117° C/0.015 mm Hg, n_D^{20} 1.4310, d_4^{20} 1.1538. References: 3 Russian.
[14-7813]

UDC 547.26'118

SYNTHESIS OF PHOSPHORYLATED ALKANOLS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 50, No 9, Sep 80 pp 2134-2135
manuscript received 18 Apr 80

BREL', A. K., RAKHIMOV, A. I. and FILIMONOVA, L. M., Volgograd Polytechnical Institute

[Abstract] Synthetic methods were developed for production of phosphorylated alcohols based on transesterification of the products of homolytic addition of alcohols to dialkylvinylphosphonate. The following compounds have been obtained (the compound, b.p.°C/mm Hg, d_4^{20} and n_D^{20} being reported): 2-dimethylphosphonethanol, 98-101/1-2, 1.2339, 1.4439; 2-diethylphosphonethanol, 112-115/2, 1.1196, 1.4372; 3-dimethylphosphonepropanol, 111-112/1.5-2, 1.2001, 1.4481; 3-diethylphosphonepropanol, 94-96/1, 1.1016, 1.4418; and 4-dimethylphosphono-2-methyl-2-butanol, 139-142/2-2.5, 1.1278, 1.4478. References: 2 Russian.
[14-7813]

UDC 547.56+535.34:542.91

PHOSPHOROTROPY IN N^1,N^2-DIMETHYL-N'-2-(1,3,2-DIOXAPHOSPHOLANYL)-BENZAMIDINE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 50, No 9, Sep 80 pp 2133-2134
manuscript received 22 Apr 80

NEGREBETSKIY, V. V., BOGEL'FER, L. Ya., KAL'CHENKO, V. I., KRISHTAL', V. S., SINITSA, A. D. and MARKOVSKIY, L N., Institute of Organic Chemistry, UkSSR Academy of Sciences, All-Union Scientific Research Institute of Chemical Plant Protective Agents

[Abstract] Using PMR spectroscopy, a degenerated reversible intramolecular migration of the dioxaphospholane group was observed in N^1,N^2-dimethyl-N'-2-(1,3,2-dioxaphospholanyl)benzamidine (I). This is the first observed case of a reversible triade phosphorotropic migration of a tricoordinated trivalent phosphorus. To obtain I, b.p. 112-114° C/0.05 mm Hg, n_D^{20} 1.5680, 2-chloro-1,3,2-dioxaphospholene was added to a benzene solution of N^1,N^2-dimethyl-N'-trimethylsilylbenzamidine. References: 3 Russian.
[14-7813]

UDC 546.18

ADDITION OF HYDROPHOSPHORYL COMPOUNDS TO THE PHOSPHORUS-NITROGEN DOUBLE BOND OF THE DIIMIDOPHOSPHENIC ACID N,N,N',N"-TETRAKIS(TRIMETHYLSILYL) AMIDE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 50, No 9, Sep 80 pp 2132-2133
manuscript received 21 Apr 80

ROMANENKO, V. D., RUBAN, A. V. and MARKOVSKIY, L. N., Institute of Organic Chemistry, UkSSR Academy of Sciences

[Abstract] Diethylphosphite and O-ethylphenylphosphonite add to N,N,N',N"-tetrakis(trimethylsilyl) amide of diimidophosphenic acid to form mixed anhydrides of diamidoimidophosphoric and phosphorous or phosphonous acids. The products are colorless liquids stable at 0° C in inert atmosphere; they decompose during distillation. Preliminary data favor a thermodynamically rather than kinetically controlled reaction mechanism.
[14-7813]

UDC 547.26'118:542.951:541.127:541.128.12

REACTIVITY OF PHOSPHORIC ACID p-NITROPHENYL ESTERS IN AMINE CATALYZED ALCOHOLYSIS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 50, No 9, Sep 80 pp 1997-2001
manuscript received 23 Jul 79

BEL'SKIY, V. Ye., KUDRYAVTSEVA, L. A., DERSTUGANOVA, K. A., FEDOROV, S. B. and IVANOV, B. Ye., Institute of Organic and Physical Chemistry Imeni A. Ye. Arbuzov, Kazan' Branch of the USSR Academy

[Abstract] Kinetic data were obtained for the reaction of p-nitrophenyl esters of various phosphoric acids (I) with ethanol in presence of primary, secondary and tertiary aliphatic amines. It was established that solvolysis of I occurs via phosphorylation of alcohol. Esters with two and three p-nitro groups then replace the p-nitrophenoxy groups by the ethoxy groups. Catalytic activity of the amines increases in the following order: Bu_3N Bu_2NH $C_5H_{11}NH_2$. When the structure of esters is considered, the reaction rate constants show a tendency to increase with the increase of electron-accepting properties of the substituents at the phosphorus atom. Compounds with a P=S group show lowered reactivity. References 16: 7 Russian, 9 Western.
[14-7813]

UDC 547.26'118

REACTIONS OF PHOSPHORUS CONTAINING DISULFIDES. REACTION OF BIS(DIALKOXY- AND DIARYLTHIOPHOSPHORYL)DISULFIDES WITH DIAZOMETHANE AND DIAZOACETIC ESTER

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 50, No 9, Sep 80 pp 1990-1994
manuscript received 28 Dec 79

KHASKIN, B. A., SHELUCHENKO, O. D., TORGASHEVA, N. A. and PROMONENKOV, V. K., All-Union Scientific Research Institute of Chemical Plant Protective Agents

[Abstract] During the reaction of bis(dialkoxy- and diarylthiophosphoryl)disulfides with diazomethane, a methylene group is inserted between the two S atoms of the disulfide to form respective bis(dialkoxy- and diarylthiophosphorylthio)methanes, water insoluble oils, or crystals soluble in most organic solvents. The reaction occurs at 0 to -5° C with evolution of nitrogen. In an analogous manner bis(dialkoxythiophosphoryl)disulfides react with diazoacetic ester with or without copper powder as a catalyst to yield bis(dialkoxythiophosphorylthio)-ethoxycarbonylmethanes. References 6: 3 Russian, 3 Western.
[14-7813]

UDC 547.78'558

REACTION OF PHOSPHORYLISOCYANATES WITH SOME HYDANTOIN DERIVATIVES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 50, No 9, Sep 80 pp 1987-1990
manuscript received 20 Nov 79

MYL'NIKOVA, L. M., MANDEL'BAUM, Ya. A. and SOYFER, R. S., All-Union Scientific Research Institute of Chemical Plant Protective Agents

[Abstract] To a solution of 3-phenylhydantoin in methylene chloride, 0,0-diethylphosphate isocyanate was added, followed by triethylamine to yield 3-phenyl-1-[N-(0,0-diethylphosphoryl)carbomoyl]hydantoin. Analogously the propyl and butyl derivatives were obtained. To obtain 3-phenyl-1-[N-(0,0-diethylthiophosphoryl)-carbamoyl]hydantoin, 0,0-diethylthiophosphate isocyanate was used. The products are unstable, decomposing on storage to the initial hydantoin and 0,0-dialkylphosphoric or -thiophosphoric acid amide. 1,3-Disubstituted 5-hydroxy hydantoins react with phosphorylisocyanates to form 1,3-disubstituted-5-N-[0,0-dialkyl(thio)phosphoryl]-carbamoylhydroxy hydantoins which decompose during the reaction back to the initial hydroxyhydantoins of 0,0-dialkyl-thio)phosphoric acids amides. The reactions were controlled by means of the ^{31}P NMR spectroscopy. References 5: 2 Russian, 3 Western.
[14-7813]

UDC 547.558+541.85+541.515

HOMOLYTIC REACTIONS OF ORGANOPHOSPHORUS COMPOUNDS. 7 COMMUNICATION. REACTIONS OF PHOTOEXCITED TRIPHENYLPHOSPHINE AND OF THE RADICALS FORMED DURING ITS HOMOLYSIS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 50, No 9, Sep 80 pp 1981-1987
manuscript received 9 Feb 80

LEVIN, Ya. A., GOL'DFARB, E. I. and VORKUNOVA, Ye. I., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch of the USSR Academy of Sciences

[Abstract] Photolysis of triphenylphosphine was studied by means of chemical polarization of phosphorus nuclei [$CPN^{31}P$]. Photolysis of Ph_3P in alcohol, acetonitrile, nitromethane, dimethylsulfoxide, toluene and benzene is a reversible process. The radical pair preceding the recombination product is a triplet heminate pair. Therefore, photoinduced homolysis of triphenylphosphine occurs in the triplet excited state $^3Ph_3P$ formed from the intercombination conversion of the originally forming 'Ph_3P. Another possibility is existence of an unknown type of disproportionation based on a capture of an ortho hydrogen atom from the phenyl radical leading to the formation of dehydrobenzene. In reactions occuring in presence of di-ter-butylperoxide, one mechanism for the formation and polarization of triphenylphosphine oxide is based on a possible split of the peroxide along

the O-O bond by the excited triphenylphosphine molecule, leading to the formation of a radical pair. Figures 3, references 23: 5 Russian, 18 Western.
[14-7813]

UDC 547.558.1

SYNTHESIS OF 6-PHOSPHONIUMQUINALDINE SALTS AND THEIR UV AND IR SPECTRA

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 50, No 9, Sep 80 pp 1978-1981
manuscript received 12 Feb 80

SHEVCHUK, M. I., ChERNYUK, I. N., VOLYNSKAYA, Ye. M., SHELEST, V. V. and YAGODINETS, P. I.

[Abstract] Heating equimolar quantities of 6-iodoquinaldine and triphenylphosphine to 235-240° C in a sealed ampule yielded 6-triphenylphosphoniumquinaldine iodide I, m.p. 102-103° C. 1-Methyl-6-triphenylphosphoniumquinaldine bis-perchlorate II m.p. 137-138° C and 1-methyl-6-iodoquinaldinium iodide III, m.p. 280° C were also obtained. UV spectra of I and II exhibited intensive absorption bands at 220, 265 and 335 $m\mu$; the 220 and 335 maxima were characteristic of the quinoline cycle, the one at 265 $m\mu$ was assigned to the triphenylphosphonium group. The IR spectra of I, II, III were analyzed in the 1600-700 cm^{-1} region, comparying them to spectral properties of quinoline. References 8: 6 Russian, 2 Western.
[14-7813]

UDC 547.241

REACTION KINETICS OF DIETHYLCHLOROPHOSPHINE WITH CYCLOHEXANE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 50, No 9, Sep 80 pp 1975-1977
manuscript received 29 Jun 79

NURTDINOV, S. Kh., SULTANOVA, R. B., NURTDINOVA, S. S., ZYKOVA, T. V., DOROZHKINA, G. M. and TSIVUNIN, V. A., Kazan' Chemical-Technological Institute imeni S. M. Kirov

[Abstract] The reaction of diethylchlorophosphine with cyclohexanone goes through a donor-acceptor interaction, where the phosphorus atom acts as an acceptor and the carbonyl group as a donor. This leads to an unstable intermediate phosphonium type product with a positive charge on the phosphorus atom. The reaction was found to be first order in respect to cyclohexanone, and independent of the concentration of diethylchlorophosphine. The first stage was rapid and reversible. The limiting stage was the transition of the donor-acceptor complex into the intermediate $[(C_2H_5)_2P\text{-}O\text{-}C\bigcirc]^+Cl^-$ which rapidly converted through a sp^3-hybrid state to a thermodynamically stable state of the phosphorus. Figures 2, references: 6 Russian.
[14-7813]

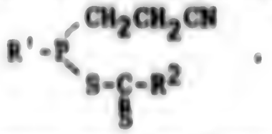
UDC 547.1.118+547.495.2

REACTION OF ALKYL(β-CYANOETHYL)PHOSPHONOUS ACID AMIDES WITH CARBON DISULFIDE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 50, No 9, Sep 80 pp 1972-1974
manuscript received 29 Oct 79

ALEKSANDROVA, I. A., KHAYRULLIN, V. K., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch of the USSR Academy of Sciences

[Abstract] Methyl and ethyl(β-cyanoethyl)phosphinous acid amides were reacted with excess carbon disulfide. Upon mixing the reagents, the temperature immediately rose and a dark red solution was obtained with an NMR ^{31}P signal δ_P -44 m.d. The red color changed rapidly to yellow and the product gave a resonance signal at δ_P -28 m.d. Evidently, the reaction went through an intermediate stage to form a dipolar product which converted rapidly to the final product



Additional studies are necessary to determine the exact structure of these products. References 7: 3 Russian, 4 Western.
[14-7813]

UDC 535.33.34:539.19

SPECTRAL STUDY OF INTRAMOLECULAR INTERACTIONS OF ARYLPHOSPHORANES AND THEIR COMPLEXES WITH LEWIS ACIDS, AND THEIR STATES IN SOLUTIONS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 50, No 9, Sep 80 pp 1958-1972
manuscript received 26 Dec 79

SERGIYENKO, L. M., RATOVSKIY, G. V., DMITRIYEV, V. I. and TIMOKHIN, B. V., Institute of Petro- and Coalchemical Synthesis at the Irkutsk State University imeni A. A. Zhdanov

[Abstract] Intramolecular reactions of arylchlorophosphoranes and their compositions in solutions were studied for comprunds containing various substituents in para-position to PCl_4: F, Cl, CH_3, CH_3O; their salt-like complexes $[ArPCl_3]^+$. $[PCl_6]^-$, $[ArPCl_3]^+ \cdot [AlCl_4]^-$ and $ArPOCl_2$ acid dichlorides. The following solvents were studied: cyclohexane, benzene, dichloroethane, acetonitrile and nitromethane. In cyclohexane and dichloroethane chlorophosphoranes were found to be in molecular form. Only p-methoxy derivative was mildly ionized. In acetonitrile and nitromethane all except the fluoro derivatives were ionized. The degree of ionization increased, depending on the p-substituent: $H \approx F < Cl < CH_3 < CH_3O$. The degree of ionization in the solvents increased in the following order: cyclohexane dichloroethane acetonitrile nitromethane. The acceptor properties of phosphohalogenic systems are expressed through their intermolecular interactions.

According to the UV spectral analysis, the binding of the phosphorus containing groups to the aromatic moieties and the intermolecular donor-acceptor interaction with acetonitrile and nitromethane increased in order: $-POCl_2 < -PCl_4 < [-PCl_3]^+$. This interaction may be connected with the $p\pi$-$d\pi$ as well as σ-π interaction of their vacant orbitals. It is possible that the binding of unshared pairs of phosphoryl oxygen with vacant orbitals of phosphorus are competing processes limiting the ability of the phosphohalide group to interact with acetonitrile and nitromethane. Figures 5, references 16: 11 Russian, 5 Western.
[14-7813]

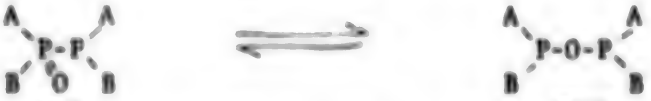
UDC 541.623+547.26'118+547.419.1

ANHYDRIDES OF O-ALKYLDIALKYLAMIDOPHOSPHOROUS ACIDS AND THEIR ISOMERIC MONOXIDES. PHOSPHOROTROPIC TAUTOMERISM

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 50, No 9, Sep 80 pp 1950-1957 manuscript received 29 Oct 79

FOSS, V. L., LUKASHEV, N. V., BORISENKO, A. A. and LUTSENKO, I. F., Moscow State University imeni M. V. Lomonosov

[Abstract] Relative thermodynamic stability of symmetric diphosphine monoxides and their isomeric phosphorous acid anhydrides depends on the substituents A and B:



(I) (II)

when A=B=OR, the equilibrium favors II, while with A=B=NR_2, the tautomerism is shifted towards I. In mixed cases, when A=EtO and B=Et_2N, the situation is more complex. A series of anhydrides and their tautomeric monoxides was synthesized by reacting O-alkyldialkylamidophosphorous acids with their acid chlorides to investigate this problem: 1) A=EtO, B=Et_2N; 2) A=iPrO, B=Et_2N; 3) A=BuO, B=Et_2N; 4) A=EtO, B=Morph; 5) A=EtO, B=PhNMe. As a rule, all these products were obtained in a tautomeric mixture of about equal composition, except for 5), where B represented only a 3-5 percent fraction of the total composition. These products are not stable and convert to anhydrides with temperature increase. References 14: 11 Russian, 3 Western.
[14-7813]

UDC 547.241+541.127

FORMATION OF PHOSPHORUS YLIDS BY THE REACTION OF S-PHOSPHORYLATED MALONIC ESTER WITH α-CHLORO ETHERS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 50, No 9, Sep 80 pp 1946-1950
manuscript received 26 Dec 79

MALENKO, D. M., KASUKHIN, L. F., PONOMARCHUK, M. P. and GOLOLOBOV, Yu. G., Institute of Organic Chemistry, UkSSR Academy of Sciences

[Abstract] α-Haloethers undergo Arbuzov rearrangement with esters of C-phosphorylated trivalent phosphorus carboxylic acids containing no labile α-H atom. With 0,0-diethyl(ethoxycarbonyl)methylphosphite, these electrophiles react by another mechanism, yielding ylides instead. Both reactions undergo a common intermediate structure of a quasi-phosphonium type which then converts to ylids or phosphinates, eliminating HCl or EtCl respectively, depending on the presence or absence of the labile α-H atom. In an attempt to verify an earlier assumption that the formation of ylides undergoes a stage of deprotonation of the phosphoric reagents, reaction rates were compared for phenylaside imination of 0,0-diethylbis(ethoxycarbonyl)methyl- and ethylphosphonites in THF and THF-triethyl amine mixture. The results showed that the formation of ylides occured without preliminary deprotonation. References: 9 Russian.
[14-7813]

UDC 541.127+541.69+546.185

STERIC EFFECT IN REACTIONS OF PHOSPHORIC ACID PHENYL ESTERS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 50, No 9, Sep 80 pp 1937-1946
manuscript received 18 Dec 79

PONOMARCHUK, M. P., KASUKHIN, L. F., BUDILOVA, I. Yu. and GOLOLOBOV, Yu. G., Institute of Organic Chemistry, UkSSR Academy of Sciences

[Abstract] Steric blocking of a reactive phosphorus site depends on the reaction type. Analysis of ten reactions of organophosphorus compounds (OPC) with inductive, resonance and steric substituents at the phosphorus atom showed that the steric effect varied considerably, depending on the space configuration of the attacking agent. The pesticide properties and toxicity of OPC are related to their ability to inhibit acetylcholinesterase which regulates the transfer of nerve impulses in living systems. The end result of the inhibition is the nucleophilic phosphorylation of the active site of the enzyme. In an earlier study it was shown that the α-methyl group in vinyl phosphates lowered their antiesterase activity. This phenomenon was then verified on other compounds. It was shown that the introduction of a methyl group into the ortho position of an aromatic ring lowered alkaline hydrolysis of 0,0-dialkyl-0-(4-cyanophenyl)phosphates and thiophosphates by a 1.5-2.5 fold order of magnitude; the inactivating effect of these phosphates

towards acetylcholinesterase was lowered by 10-100 fold. No steric effect of an ortho-methyl group was noted on the imination of analogous arylphosphites and thiophosphates. Thus it was shown that spacial blocking of the phosphorus with alkyl radicals may be used to lower anticholinesterase activity of OPC's. Figures 3, references 35: 13 Russian, 22 Western.
[14-7813]

PESTICIDES

UDC 632.93:633.491

PREPARATIONS TO PROTECT POTATOES AGAINST THE PHOMA MOLD

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 11, 1980 pp 12-13

DOROZHKIN, N. A., academician of the BSSR Academy of Sciences, BEL'SKAYA, S. I., candidate of biological sciences, Institute of Experimental Botany imeni V. F. Kuprevicha, BSSR Academy of Sciences and POPOV, F. A., candidate of agricultural sciences, Belorussian Scientific Research Institute of Potato and Fruit Growing

[Abstract] Artifically infected tubers were treated with various compounds for 30 days at a temperature of 8-10° C. The most effective fungicides and the percent reduction in infection relative to the controls in the laboratory experiments were as follows: pirocarbolid, 57.2%; vitatiuram, 45.9%; benomil, 44.4%; and BMK, 43.2%. The remaining eight compounds reduced the incidence of infection by less than 35%. In subsequent evaluations, four preparations were tested with respect to the incidence of infection and the percent of potato production which could be marketed (as compared to control values of 3.5% and 82% respectively): benomil, 0%, 89.7%; tsineb, 2.0%, 85.6%; fundozol, 1.2%, 89.7%; and TMTD, 0.9%, 89.6%. The best results were obtained for a 0.5% benomil suspension where each ruble invested into the fungicide returned 173.6 rubles of increased yield. References 7: 5 Russian, 2 Western; Tables 2.
[29-12027]

UDC 632.951

TOXICITY OF INSECTICIDES AGAINST INSECTS INFESTING CLOVER

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 11, 1980 pp 15-17

IVANOV, S. G. and ZHUKOVSKIY, S. G., candidate of agricultural sciences, VIZR

[Abstract] The title study was carried out using seven classes of compounds on insects in the imago stage which were found in the clover, such as the seven-spot beetle, aphid lion, seed and stem chaloids, etc. The toxicity parameter was the concentration necessary to cause a 50% mortality in 24 hours. Although

there is some variation in toxicity for the different types of insects, the compounds examined can be roughly divided into three groups: highly toxic - valekson, permetrin, bazudin, ekamet, and aktellik; moderately toxic - geterofos; and slightly toxic - evisekt. The most toxic compounds for the entomophages are aktellik, ekamet, velekson, bazudin, and permetrin; the least toxic is evisekt. The most toxic for the bees are aktellik, ekamet, valekson, bazudin, and evisekt. When all of the data are taken into consideration, the recommended compounds are aktellik, valekson, bazudin, and ekamet. References 5: Russian; Tables 3.
[29-12027]

UDC 632.954:635.21

METAZIN AND SULFAZIN ON POTATO PLANTS

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 11, 1980 pp 20-22

BEREZOVSKIY, M. Ya., doctor of agricultural sciences, ZHUKOVA, P. S., doctor of agricultural sciences, SHIRKO, T. S., candidate of agricultural sciences, Belorussian Scientific Research Institute of Potato and Fruit Growing

[Abstract] Metazin (2-N-methyl-N-cyano-4,6-bis-isopropylamino-sym-triazin) and sul'fazin (2-N-methyl-N-cyanamino-4,6-bis-isopropylamino-sym-triazine sulfate) are new domestic herbicides which are selective for controlling young dicotyledonous weeds. These compounds were evaluated in field and laboratory experiments. The effectiveness of reducing the weeds was as follows: metazin, in doses of 1,2, and 3 kg/hectare, after 20 to 25 days: 67.1%, 77.7%, and 81.7%; the same after 55-60 days: 40%, 31%, and 33%; sul'fazin, same doses, after 20 to 25 days: 70%, 77.6%, and 80%; the same, after 55 to 60 days: 34%, 29%, and 27% respectively. The herbicides exerted no adverse effect on the yield or quality of the potato tubers. The dry weight of the potatoes exposed to these herbicides was 0.6 to 1.8% greater than the controls but the concentrations of starch were practically identical. Residual amounts of metazin in the potatoes exposed to doses of 1,2, and 3 kg/hectare were 0.25, 0.34, and 0.40 mg/kg respectively. Residual amounts of metazin in the soil were in the range of 0.05 to 0.06 mg/kg. References 8: 6 Russian, 2 Western; Tables 5.
[29-12027]

UDC 632.954

HERBICIDES TO COMBAT CRAWLING SMARTWEED IN THE TSELINOGRAD AREA

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 11, 1980 pp 24-26

KIDRISHEV, T. K., Kazakhskiy Scientific Research Institute for the Protection of Plants, STYAZHKOVOY, V. V., All-Union Scientific Research Institute of Grain Economy

[Abstract] A 3-year study was carried out to evaluate polidim, tordon 22K, khloramp, and banbel at different doses (from 1.0-20 kg/hectare) individually and in various combinations with each other and with Naa5 (ammonium nitrate). The effectiveness of the herbicides against smartweed was evaluated both on its ability to suppress the above-ground portion of the plant and on its toxicity to the root system. During the first year after application of the herbicides at a depth of 10-12 cm., no living smartweed crowns were observed. Damaged crowns were observed at depths of 25-30 cm. and occasionally at 40 cm. when large doses of tordon 22K were used. Complete destruction of the crowns at 0-60 cm. depth range was observed throughout the 3 years of the experiment when tordon 22K or khloramp (1.5 - 2.0 kg/hectare) mixed with ammonium nitrate was applied at a depth of 10-12 cm. When the same herbicide mixtures were applied at a depth of 23-25 cm., the zone free of smartweed crowns was extended to 50 cm. References 6: Russian; Tables 3.
[29-12027]

UDC 632.954:635.656

HERBICIDES ON PEAS AS PART OF A VEGETABLE CROP ROTATION

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 11, 1980 pp 22-24

BONDARENKO, G. L., candidate of biological sciences, and VITANOV, A. D., Ukrainian Scientific Research Institute of Vegetable Melon Growing

[Abstract] Fields were treated with the herbicides prometrin in doses of 1.5 to 2 kg/hectare, and linuron (2-3 kg/hectare) using a backpack sprayer 2-3 days after the peas were sown. Neither herbicide decreased the density of pea plant growth or retarded the plant development. Linuron in a dose of 3 kg/hectare somewhat suppressed the individual pea plants during the sprouting stage, which caused drying out of the lower leaves. Data taken over a 3-year period show that these two herbicides suppress dicotyledonous weeds to a greater extent than monocotyledonous weeds. Pigweed was the most sensitive (90 - 99% destroyed), followed by amaranth (91 - 96% destroyed) and deadly nightshade (85 - 99% destroyed). Linuron, which has a rather long effective life, is inactivated in the soil after 2-3 months. The addition of 0.8 kg/hectare of treflan to the above doses of prometrin and linuron significantly increased the herbicide effectiveness. References 4: 2 Russian, 2 Western; Tables 2.
[29-12027]

UDC 632.954:633.63

USE OF HERBICIDES DURING CULTIVATION OF SUGAR BEETS ON IRRIGATED LANDS OF THE SOUTHERN UKRAINE

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 6, 1980 pp 47-48

GOROBETS, A. S., candidate of agricultural sciences, KOLOMIYETS, A. P., candidate of agricultural sciences, NEDASHKOVSKIY, A. I., candidate of agricultural sciences and GORODOV, M. F., All-Union Scientific Sugar Beet Research Institute

[Abstract] Application of mixtures of herbicides to chernozem soils with 3.27 percent humus in the plowed layer at the Shevchenko sovkhoz of Zhovtneyyy Rayon of Nilolayeyevskaya Oblast showed that the most effective mixtures are lenatsil (1.2 kg/hectare) + sodium trichloroacetate (8 kg/hectare), and ronite (4 kg/hectare) + dichloral urea (8 kg/hectare) + lenatsil (1.2 kg/hectare) and betanal (6 l/hectare). A 3-year use of these mixtures reduced manual labor on weed removal from one hectare by an average of 46.2 man hours; root yield increased 68-69 quintals/hectare; sugar content increased 0.7 percent and sugar yield increased 13.9 to 15.5 quintals/hectare in comparison with plots without herbicides application.
[228-2791]

UDC 632.954:633.11

HERBICIDES FOR YOUNG WHEAT IN WESTERN SIBERIA

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian Vol 18, No 9, 1980 pp 37-39

VLASENKO, A. N., candidate of agricultural sciences, Siberian Scientific Research Institute of Farming and Agricultural Shemicalization

[Abstract] The effectiveness of the herbicides diamite-D, bayyalan, dozanex, karakhal, suffix and KhOE-23408 in new wheat fields was studied. Diamite-D was found to be suitable for the control of dicotyledenous weeds, including those resistant to 2,4-D, at a dose of 1-1.56 kg/hectare. Mixtures of bayyalan and dozanex, at 2-4 kg/hectare and 3-5 kg/hectare respectively, were toxic to bristle grass as well. Karakhol, suffix and KhOE-23408 were highly effective against wild oats. Since bayyalan, dozanex and KhOE-23408 retard wheat development by 3-10 days they must be used at an early stage of field growth. References 6: Russian.
[25-12126]

UDC 632.951

ON THE EFFECT OF FUNGICIDES ON INSECTICIDE TOXICITY

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian Vol 18, No 9, 1980 pp 36-37

POPOV, P. V., SHAPOVALOVA, G. K., ABELENTSEVA, G. M. and SEDYKH, A. S., All-Union Scientific Research Institute of Chemicals Used for Plant Protection

[Abstract] The compatability of the insecticides valexon, pirimiphos-methyl, fozalon, phthalophos and TsGA 18809 with the fungicides tsineb, copper oxychloride and polycarbatsin (first group) and of the insecticides benzophosphate and chlorophos with the fungicides benomyl and BMK (second group) was determined using a 1:1.25 ratio of insecticide to fungicides. Insecticide toxicity was measured with an acetone extract on house flies. The first group was studied both fresh and after 24 hours storage of the mixture; the second group fresh only. None of the fungicides exhibited insecticidal properties after mixing and extraction. Phytocidicity was determined using bean leaves. It was found that the fungicides did not significantly affect insecticide toxicity and that phytotoxicity was not increased, indicating that the compounds may be used together.
References: 2 Russian.
[25-12126]

PETROLEUM PROCESSING TECHNOLOGY

UDC 665.666.62

GROUP COMPOSITION OF NITROGEN COMPOUNDS IN UKRAINIAN OILS

Moscow NEFTEKHIMIYA in Russian No 5, 1980 pp 753-755 manuscript received 11 Jun 79

SEVAST'YANOVA, G. V. and GAYEVA, L. I., Ivano-Frankovskiy Institute of Oil and Gas

[Abstract] The title study carried out using 15 oils, showed that nitrogen is present in these samples as a complex mixture of pyridine, quinoline, acridine and other high molecular weight aromatic derivatives. The following values were obtained: Total nitrogen, 0.077-0.127%; basic nitrogen, 0.024-0.078%; $-NH_2$, 0.002-0.008%; $=NH$, 0.001-0.33%; $\equiv N$, 0.020-0.071%. The values in all these categories increased after the oils were reduced with $LiAlH_3$, with one exception. The largest relative increase was noted for the tertiary amines, which increased from 56.1 to 90.7% of the total nitrogen and from 82.5 to 98.7% of the basic nitrogen. The fraction of residual nitrogen in the oils ranged from 2.47 to 40.62%. Thus some of the oils contain large amounts of nitrogen which cannot be reduced. References 13: 6 Russian; 7 Western; Figures 1; Tables 1. [12-12027]

UDC 542.943:665.753.2.035.5

OXIDATION OF T-6 HYDROCARBON FUEL AS A TEST SYSTEM FOR ANTI-OXIDANTS

Moscow NEFTEKHIMIYA in Russian No 5, 1980 pp 719-731 manuscript received 19 Jul 79

KHARITONOV, V. V., TEREKHIN, S. N. and VISHNAYAKOVA, T. P., Moscow Institute for Petrochemical and Gas Industries imeni I. M. Gubkin

[Abstract] The title study was carried out to establish quantitatively the oxidation kinetics of T-6 fuel oil within the temperature range 110°-180° C in order that this system might be used to evaluate anti-oxidants. The liquid-phase oxidation of this complex mixture differs from that of individual compounds in that the former has these characteristics: ROOH decomposes into free radicals by bimolecular decomposition rather than by a second order reaction with respect

to the hydroperoxide; there is no induction decomposition of ROOH; the activation energy for the ROOH decomposition is lower. Part of the oxygen taken up by the fuel oil during oxidation forms peroxides and another part forms other oxygen-containing products. The data obtained for this system can also be used to evaluate anti-oxidants at higher temperatures. References 16: 15 Russian, 1 Western; Figures 3; Tables 6.
[21-12027]

UDC 547.214:542.943

CHEMICAL OXIDATION OF ISOBUTANE

Moscow NEFTEKHIMIYA in Russian No 5, 1980 pp 677-682 manuscript received 23 Jan 79

KHIRNOVA, G. P., BULYGIN, M. G., BLYUMBERG, E. A., KHCHEYAN, Kh. Ye. and YEMELIN, Yu. D., Institute of Chemical Physics, USSR Academy of Sciences, and All-Union Scientific Research Institute of Organic Synthesis, Novokuybyshevskiy Branch

[Abstract] The title reaction is a classic example of a slow chain reaction and is important commercially as a method of preparing ter-butylhydroperoxides (TBHP's). A detailed study was carried out of the kinetics of product build-up during the liquid-phase reaction in several solvents: benzene, chlorobenzene, ter-butyl alcohol, isopropyl alcohol, acetone, ethyl alcohol, and acetonitrile. The fastest accumulation of TBHP occurred when ter-butyl alcohol was used as the solvent and the greatest selectivity, in acetonitrile. The selectivity of the reaction isobutane ——→ TBHP is approximately the same when carried out in aluminum, glass, or titanium vessels; but it is significantly lower in stainless steel reactors. The possibility of increasing the selectivity of the uncatalyzed oxidation is not limited by the thermal decomposition of the hydroperoxide. References 18: 9 Russian; 9 Western; Figures 3; Tables 3.
[21-12027]

UDC 665.644.442

THE INFLUENCE OF PRESSURE ON THE AROMATIZATION OF n-PARAFFINS

Moscow NEFTEKHIMIYA in Russian No 5, 1980 pp 669-673 manuscript received 24 Oct 79

BEREZIN, V. A., RABINOVICH, G. B., BORISEVICH, Yu. P., LEVINTER, M. Ye. and ZABOTIN, L. I., Kuybyshev Polytechnic Institute imeni V. V. Kuybysheve

[Abstract] The title study was carried out with the alkanes n-heptane and n-decane to document the inter-relationship between pressure, extent of aromatization, rate of coke-formation, and the degree of catalyst poisoning by the coke. The maximum yield of aromatic hydrocarbons occurs at about 0.5 MPa

at a temperature of 530° C for n-decane and at about 500° C for n-heptane. The temperature of the maximum yield decreased with increasing pressure: 1.0 MPa at 500° C and 1.5 MPa at 470° C for decane. Thus, the higher the molecular weight of the reactant, the higher the temperature must be to obtain the maximum selectivity for aromatization. For both alkanes, the gas yield increases and the coke yield decreases with increasing pressure. For n-heptane, the yield of both of these products also decreases with decreasing temperature. With increasing pressure, therefore, the yield of aromatic hydrocarbons passes through a maximum, while increasing temperature and decreasing molecular weight of the reactants drive the maximum towards lower pressures. References 7: 5 Russian, 2 Western; Figures 1.

[21-12027]

UDC 547.216:541.183+542.952

ISOMERIZATION REACTION OF n-HEXANE ON Pd-ZEOLITE CATALYSTS CONTAINING RARE-EARTH CATIONS

Moscow NEFTEKHIMIYA in Russian No 5, 1980 pp 655-658 manuscript received 18 Jun 79

DADASHEV, B. A., MAMEDOV, S. E., SARYDZHANOV, A. A., MAMEDOVA, S. M. and DZHAVADOVA, K. G., Institute of Petrochemical Processes, Azerbaijan SSR Academy of Sciences imeni Yu. G. Mamedaliyev

[Abstract] The title study was performed in order to establish a correlation between the catalytic and the acidic properties of Pd-zeolite catalysts. The influence of rare earth elements (REE's) on the activity of a catalyst is more noticable at low temperatures (280°-300° C) than at higher temperatures (320°-350° C). Whereas the difference in the yields of isohexanes between Pd/HoCaY and Pd/NdCaY catalysts is 11% at 280° C, at 320° C, the difference between the yields dropped to 2.9%. At intermediate temperatures (280°-320° C), the activity of the Pd-zeolite catalyst is a function of the magnitude of the electrostatic potential of the REE cation and decreases in the following order: Pd/LuCaY > Pd/HoCaY > Pd/DyCaY > Pd/GdCaY > Pd/NdCaY > Pd/PrCaY > Pd/LaCaY. At 350° C, however, the activities are practically the same. The larger the activity and selectivity of the catalysts, the larger the number of medium-acidity sites. Substitution of up to 5% calcium cations for the REE in the PdCaY catalyst leads to an increase in the number of medium-acidity sites; further substitution increases the number of strong-acid sites, which decreases the activity and selectivity of the catalysts in the isomerization reactions. References 7: 6 Russian, 1 Western; Figures 2; Tables 1.

[21-12027]

UDC 547.313.5:541.128.34

SELECTIVE ISOMERIZATION OF n-PENTENES IN THE PRESENCE OF ACID CATALYSTS

Moscow NEFTEKHIMIYA in Russian No 5, 1980 pp 659-664 manuscript received 3 Dec 79

OTREMBA, M., ZAYDEL', V. and TANIYEVSKI, M., Silesian Polytechnical Institute, Gliwice, Poland

[Abstract] Thirty catalysts were prepared by treating alumina with various solvents (CCl_4, HCl, NH_4HF_2, HF, $(NH_4)_2NF_2$, H_2SO_4, and others) so that chlorine, fluorine, and sulfate ions would be introduced into the catalysts. The result of these substitutions is that the acidity of the alumina and hence its catalytic activity and selectivity during the process of the isomerization of n-pentenes are altered. Transition metal salts were also added to some of the runs. The rate of selective isomerization of the n-pentenes on these catalysts was much slower than the rate of double bond migration. The position of the double bond in the reactant pentene (pentene-1 and pentene-2) does not affect the products as the latter are close to equilibrium. For a temperature increase from 199° C to 375° C, the yield of methylbutenes increased from 4.5% to 7.5% and the pentene-2/pentene-1 ratio decreased from 9.5 (theoretical, 10.9) to 5.7 (theoretical, 5.4). The temperature at which 50% of the methylbutene yield had been attained ranged from 263° to over 500° C, and the dimer yield, from 0.4% to 4.5%. Thus the catalytic properties of alumina can be altered by treatment with different solvents and acids followed by various heating regimes. No trends in the changes in either yields or product compositions could be detected. References 11: 6 Russian, 5 Western; Figures 3, Tables 2.
[21-12027]

UDC 66.095.7

SYNTHESIS OF 2.2.4.4-TETRAMETHYLBUTYLETHYLAMINE AND TESTING IT AS A JET FUEL ADDITIVE

Baku DOKLADY AKADEMII NAUK AZERBAYDZHANSKOY SSR in Russian No 1, 1980 signed to press 2 Jul 80 pp 64-68 submitted 30 May 1980

ISMAYLOV, F. K., MIRZABEKOVA, Kh. A., ALIYEVA, S. A., ABBASOV, V. M., AVANESOVA, S.S., Academician SHAKHTAKHTINSKIY, T. N., MARDANOV, M. A., and VELIYEV, K. G., Institute of Theoretical Problems of Chemical Technology

[Abstract] A method for preparing N-octylethylamine (2.2.4.4-tetramethylbutylethylamine) by reduction of N-octylacetamide with complex hydrides as reducing agents is discussed and data are presented on the use of the amine thus obtained as a thermostable additive to T-1 jet fuels. The use of lithium aluminum hydroxide as a reducing agent and a $LiAlH_4$ - $AlCl_3$ reducing system permitted synthesis of 2.2.4.4-tetramethylbutylethylamine, a highly effective antioxidant and

thermostable additive for jet fuels. Physico-chemical characteristics of fuel before and after addition of 0.05 weight percent of 2,2,4,4-tetramethylbutylethylamine are given in tabular form.
[224-2791]

UDC 547.535.3.033

THE PROCESS OF ISOLATING MESITYLENE FROM INDUSTRIAL CUTS

Moscow NEFTEKHIMIYA in Russian Vol 20, No 3, May-Jun 80 pp 412-415 manuscript received 2 Feb 79

KATSOBASHVILI, Ya. R., Eastern Scientific Research Coal Chemistry Institute, Kuznetskiy Branch, Institute of Petrochemical Synthesis imeni A. V. Topchiyev, USSR Academy of Sciences

[Abstract] Large scale laboratory experiments on isolating purer mesitylene by hydrogenation and dehydrogenation were carried out. The apparatus used processed 2.5 kg of coal-tar or petrochemical fractions per hour. Liquid hydrogenation products were treated in a fractionating column. Unspent hydrogen was passed through an entrainment trap and H_2S absorber before recirculation, and its concentration in the system had to be at least 35% by volume. Industrial grade aluminoplatinum was used as the hydrogenation catalyst. The reactor temperature was 360°, the pressure was 5 Megapoise and the duration of continuous operation was 263 hours. Some dealkylation was observed. The yield of useful hydrogenate was 70%. Dehydrogenation was conducted over an activated aluminomolybdate catalyst at 430° to 480° and 1 Megapoise for 105 hours. After treatment in fractionating column, a purity of 98.9-99.4% was obtained with 53-63% yield. The extent of dealkylation was 4.7%. Stabilization of reactor temperature should permit higher yields. The mesitylene obtained was suitable for the synthesis of the antioxidant Agidol-40. Figures 1; references 7: Russian.
[231-12126]

UDC 66.092.147.3:541.128.3

THE PYROLYSIS OF GASOLINE IN THE PRESENCE OF ZEOLITE

Moscow NEFTEKHIMIYA in Russian Vol 20, No 3, May-Jun 80 pp 408-411 manuscript received 11 Jun 79

MINATSEV, Kh. M., TAGIYEV, D. B., ZUL'FUGAROV, Z. G., SHARIFOVA, E. P. and ZEYNALOVA, F. A., Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences and Institute of Inorganic and Physical Chemistry, AzSSR Academy of Sciences

[Abstract] The effect of zeolite composition and structure on its catalytic activity in the pyrolysis of low quality Karachkhurskiy gasoline was studied using stationary catalyst at temperatures from 550° to 650°. Types A, X and Y

zeolite, chabazite, erionite and mordenite were tested. The highest yield of gaseous products was found with Na-mordenite and the lowest with Na-Y-zeolite, while maximum low molecular weight olefins were obtained with Na-A-zeolite. In respect to throughput, Na-mordenite was the most efficient catalyst for low molecular weight olefins, giving a 40% yield. Higher rates favor olefin production. Raising the temperature from 550° to 650° produced more gaseous products and higher yields of olefins. Na-, Co- and Ni-mordenite were the best catalysts and Li- the worst. Ni-, Co- and Mn,H- forms gave higher C_2-C_4 yields. Figures 2; references 9: 3 Russian, 6 Western.
[231-12126]

UDC 665.654:542.924

THE HYDROPYROLYSIS OF HYDROCARBON FRACTIONS UNDER ATMOSPHERIC AND ELEVATED PRESSURES

Moscow NEFTEKHIMIYA in Russian Vol 20, No 3, May-Jun 80 pp 400-407 manuscript received 13 Feb 79

TANIYEVSKI, M., LYAKHOVICH, A., MATSEYKO, D., SKUTIL', K. and FABISH, E., Silesian Polytechnical Institute, Gliwice, Poland

[Abstract] On the basis of both published work and theoretical considerations, the most probable basic routes for the action of hydrogen on the pyrolysis of hydrocarbons are discussed. The basic kinetic effect is acceleration of primary decomposition by permitting catalytic reaction with and formation of H_2, via the more active hydrogen free radical. Inhibition of secondary reactions by hydrogen at vessel walls is possible. The presence and consumption of hydrogen also facilitates demethylation, addition of hydrogen radicals to olefins to form excited radicals, reduction of lower olefins and dealkylation of alkyl aromatics. The effect of hydrogen addition on the pyrolysis of petroleum and liquid coal products was studied using a large laboratory-scale reactor and gas chromatography. In comparison to nitrogen or water, addition of hydrogen increased the yield of gaseous C_1 to C_4 products and the degree of raw material conversion, thereby indicating a kinetic effect. Similar results were observed at higher pressure (to 3 Megapoise). Increased pressure resulted in decreased ethylene and total C_1-C_4 yield; however the presence of hydrogen inhibited this effect. The process can be adjusted to maximize ethylene production. Figures 1; references 18: 9 Russian, 1 Polish, 8 Western.
[231-12126]

UDC 66.092.147.3

THE PRODUCTION OF ALLENE AND METHYLACETYLENE BY PYROLYSIS OF LIGHT HYDROCARBONS

Moscow NEFTEKHIMIYA in Russian Vol 20, No 3, May-Jun 80 pp 393-399 manuscript received 13 Mar 79

TMENOV, D. N., SHAPOVALOVA, L. P., ALIMOVA, O. V., RAYEVSKAYA, L. N. and VOZNYUK, V. I., Institute of Physical Organic Chemistry and Coal Chemistry, UkSSR Academy of Sciences

[Abstract] The production of allene and methylacetylene by thermal treatment of isobutylene in the presence of nitrogen and steam was studied. Fourth order regression equations for product formation, 4%-30% isobutylene, 0.03-0.2 sec reaction time and 800°-1000° C were employed. Short reaction times, low starting concentrations and high temperatures resulted in higher yields, of up to 46 mole%. Experimental results agreed well with calculated yields. The pyrolysis of propylene in the presence of iodine and oxygen showed that water vapor decreases the degree of conversion and the extent of oxidation and cracking. Decreasing the partial pressure of starting material and increasing iodine concentration and concentration to 1.0 mole% result in increased yields of up to 21.5%. Yields of ethylene, propylene, acetylene, C_4 and C_5 olefins and liquid aromatic hydrocarbons were determined. The data indicate that the use of light hydrocarbons is promising for industrial allene and methylacetylene production. Figures 2; references 7: 6 Russian, 1 Western.
[231-12126]

UDC 66.023.001

CHEMICAL PROCESSES AND REACTORS

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IMENI D. I. MENDELEYEVA in Russian No 5, 1980 pp 531-536

SLIN'KO, M. G., corresponding member, USSR Academy of Sciences, deputy director, Karpov Scientific Research Physicochemical Institute

[Abstract] Application of mathematical modeling to reactor design and study is reviewed on the basis of Soviet literature. A mathematical model of a reactor is primarily a kinetic model at the molecular level, which takes into account mass and heat transfer, aerodynamics and other physicochemical aspects and depends on conditions within the reactor and reactor type. Dynamic models describe hierarchial structure, bond types, nonlinear interactions and multidimensional and stochastic aspects. Kinetic equations for uniform and nonuniform surfaces are included in an example of a kinetic model of the reaction between oxygen and hydrogen on platinum catalysts. Kinetic models of polymerization and fixed-bed and fluidized-bed catalysts are also discussed. Tables 2; references 18: 17 Russian, 1 Western.
[10-9307]

UDC 338.12.665.6;330.341.4.66(164)

PROBLEMS IN THE CHEMICAL AND ENERGY-RELATED USE OF HYDROCARBON RAW MATERIAL

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IMENI D. I. MENDELEYEVA
in Russian No 5, 1980 pp 493-502

KALECHITS, I. V., professor, chief of the Chemistry Department, USSR State Committee on Science and Technology

[Abstract] The literature review covers oil and gas resources, economic aspects of oil and natural gas production and recent progress in the replacement of oil and gas by coal, primarily in West Germany and the U.S.A. Specific data are presented on the economic and production aspects of a variety of coal gasification processes, coal hydrogasification, solvent refined coal process, low-temperature carbonization of oil shale and coal, production of synthetic liquid fuel by coal hydrogenation and reduction of pressure with the use of high-activity catalysts in this process, and the Fischer--Tropsch process. Also discussed are more efficient oil refining and improvement of oil product quality by lowering the temperature of different processes, better utilization of oil refining by-products and improvement of the selectivity of petrochemical processes. Figures 3; tables 2; references 55: 7 Russian, 48 Western.
[10-9307]

UDC 661.715.25-125,665.654.2.001.53,66.097.3

PRODUCTION OF ISOPENTANE BY HYDROCRACKING OF XYLENE RAFFINATE AND HYDROFINED GASOLINE FRACTION

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 9, 1980 pp 34-36

VOL'FSON, I. S., OKRUZHNOV, A. M. and DUBOV, A. V., All-Union Scientific Research Institute of Fossil Fuels

[Abstract] The synthetic rubber industry is experiencing an acute shortage of isopentane. The hydrocracking process was investigated experimentally on a counter-current type laboratory installation equipped with two sequential reactors to select the optimum temperature conditions for the height of the reactor. The investigations were conducted to determine the possibility of increasing the pentanes yield by creation of low and high temperature reaction zones. This would increase the selectivity of pentane formation during conversion of raw stock at moderate temperatures and subsequent deep conversion of unconverted raw stock at the high-temperature zone. A straight-run gasoline fraction of 85°-180° C and a xylene raffinate were used as the raw stock. The total yield of C_4 and C_5 hydrocarbons was approximately identical in both regimes, while the yield of C_4 and C_5 isoparaffins was 8-10 percent higher in the two-zone mode. The yield of the pentane fraction was higher by 20 percent. Creation of a

low temperature hydrocracking zone has definite advantages compared to the isothermal process since the selectivity of pentane formation and the degree of isomerization of C_4 and C_5 hydrocarbons can be increased significantly. The method makes it possible to eliminate the need to recirculate large volumes of unconverted residue, and therefore the need for high cost and energy. Figures 1.
[11-6521]

UDC 621.892.27:661.183.7,621.891.2.001.5,620.197.3

IMPROVING THE PROTECTIVE PROPERTIES OF SILICA GEL LUBRICANTS WITH CORROSION INHIBITORS

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 9, 1980 pp 32-34

KHARAS, M. Ya., FUKS, I. G., KITASHOV, Yu. N., REBROV, I. Yu. and RAVIKOVICH, R.S., Moscow Institute of the Petrochemical and Gas Industry imeni Academician I. M. Gubkin

[Abstract] The protective and corrosion properties of commercial silica gel lubricants were studied and the most effective corrosion inhibitors which improve these properties and cause minimum side effects on lubricants were selected. Commercially produced silica gel lubricants have a low protective capacity which is related to the inability of these lubricants to form chemosorptive protective films on the surface of a metal and thus prevent electrochemical reactions from occurring. Silica gel lubricants containing corrosion inhibitors were capable of preventing electrochemical corrosion of steel, depending on the test conditions and the composition of the introduced additive. A significant reduction of ultimate strength and effective viscosity was observed for all lubricants containing additives, while colloidal stability is lowered, with the exception of MG-107m additive, which strengthens the lubricant. AYaA, ALOP and MG-107t additives considerably improved the protective properties of silica gel lubricants. Five percent concentration of AYaA and ALOP additives by weight gave lubricants with high protective capability and the required rheological properties.
[11-6521]

UDC 665.7.038.64,665.7.035

INVESTIGATING THE EFFECTIVENESS OF SOME TIN-CONTAINING COMPOUNDS AS ANTIWEAR ADDITIVES TO LUBRICATING MATERIALS

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 9, 1980 pp 31-32

BAGINSKIY, V. V., BUYANOVSKIY, I. A., ZEMLYANSKIY, N. N. and MATVEYEVSKIY, R. M., State Scientific Research Institute of Machine Building

[Abstract] Lubricating compositions with tin-containing additives were investigated by analyzing the adsorption, antipitting, antifriction and antiwear properties. The contact potential difference was used to evaluate the adsorption

properties of various tin-containing additives on an installation with a vibrating condensor. Trialkylstannous bromide and chloride display the highest antiwear properties, while compositions with the alkoxy- and mercaptotrialkylstannous group have the worst antiwear properties. Halogen-containing compounds had high antiwear and adsorption properties but low critical temperatures. Oil with five percent acetyloxytrialkylstannous additive increases the wear resistance and reduces the frictional coefficient, increases critical temperature, reduces contact temperature, causes no corrosion and does not affect the quality of the friction surface. The nature of the tin compounds have a significant effect on the friction and wear indices of steels. Acetyloxy derivatives of tin provide the optimum combination of antiwear, antipitting and antifrictional properties. Figures 1.
[11-6521]

UDC 665.637.3,665.6.033.28,66.065.2,543.432

DETERMINATION OF THE ASPHALTENE PRECIPITATION THRESHOLD IN PETROLEUM FRACTIONS BY THE PHOTOCOLORIMETRIC METHOD

Moscow NEFTEPERABOTKA I NEFTEKHIMIYA in Russian No 9, 1980 pp 29-31

ROGACHEVA, O. V., GIMAYEV, R. N. and GUBAYDULLIN, V. Z., Ufa Petroleum Institute

[Abstract] The effect of the composition and nature of the dispersion medium and also the composition and concentration of asphaltenes on the phase state of asphaltenes in petroleum systems were investigated in a field of centrifugal forces. The phase state of asphaltenes in petroleum fractions in a gravity field was also studied. The photocolorimetric method of determining the asphaltene concentration was used to investigate the precipitation threshold of various types of asphaltenes in the group components of the corresponding petroleum residues. Asphaltenes and group components of three residues of Kotur-Tepinskaya oil were the objects of investigation. The threshold concentrations of the precipitates differ significantly for different asphaltenes and hydrocarbon fractions at identical temperature. The threshold concentration of the asphaltene precipitate increases as temperature increases and also as the solubility of the medium increases. Gudron asphaltenes are characterized by high solubility but the threshold concentration of the asphaltene precipitate is least due to the low solubility of the group components. The highest threshold concentration of asphaltene precipitate is observed for components of the distillate cracking residue. The properties of the dispersion medium and specifically its solubility has a significant effect on the phase state of asphaltenes. Figures 1.
[11-6521]

UDC 665.642.2.001.566.022:621.926/.928

REGULATION OF PARTICLE SIZE DURING THERMOCONTACT CRACKING

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 9, 1980 pp 26-28

BARSUKOV, Ye. Ya., ZHURAVLEV, V. K. and SOSKIND, D. M., All-Union Scientific Research Institute of the Petroleum Industry

[Abstract] An experimental model of an assembly for separation and crushing of particles in a fluidized bed of a reactor or coke oven with capacity of 250 kilograms per hour is described. Preliminary separation of the particles to be crushed from the bed increases the effectiveness of regulating the fractional composition of the fluidized bed. Both fine and coarse particles with approximately the same degree of breakdown are subjected to crushing. The amount of coke separated into different fractions is in direct proportion to the total area of the outer particle surface of the given fraction. A set of equations is derived to calculate this process. The stability of the fractional composition of the coke can be provided during cracking if the rate of reduction of the average diameter of particles is numerically equal to the rate constant of particle increase during jet pulverization.
[11-6521]

UDC 547.26.118.07(088.8)

PHOSPHORUS- AND SULPHUR-CONTAINING OLIGOPIPERYLENE AS A MULTIFUNCTIONAL LUBRICATING OIL ADDITIVE

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 10, 1980 pp 32-33

BERESNEV, V. V., STEPANOV, Ye. A., KAFIYATULLINA, S. T. and O.A. YUNUSOV, Kazan' Chemicotechnical Institute imeni S. M. Kirov

[Abstract] The possibility of using diene oligomers, specifically oligopiperylenediol, as stock from which to synthesize additives with a high content of dithiophosphonic groups for use as multifunctional additives to lubricating oils was studied. The oligopiperylenediol was prepared by polymerization of inexpensive and available piperylene, a byproduct of the rubber industry. Phosphorus- and sulphur-containing oligopiperylene were prepared by interaction of oligopiperylenediol and diisopropyldithiophosphoric acid in benzene at 80° ± 2° C in the presence of benzoyl peroxide as initiator. Introduction of phosphorus and sulphur heteroatoms to oligopiperylenediol improved the antipitting and antiwear properties of oils containing these additives. The use of diene oligomers as a feed stock to synthesize multifunctional lubricating oil additives results in good antioxidant, antiwear and antipitting properties. References 5: Russian.
[13-6521]

UDC 621.892.099.21:65.018

OPERATIONAL TESTS OF DOMESTIC MOTOR OILS IN D-9H BULLDOZERS

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 10, 1980 pp 24-26

SINYANSKAYA, R. I., VOL'NYKH, V. I., SHUMKOVA, Ye. V., BELYANCHIKOV, G. P. and NIKITIN, A. G., Chukotka Branch of State All-Union Scientific Research Institute of Tractors and the All-Union Scientific Research Institute of the Petroleum Industry

[Abstract] Operational tests of experimental lots of M-10Dk and M-4z/8D motor oils were compared to SAE-30 and AE-10W oils in D-9H bulldozers. The tests were conducted on four bulldozers operating as earth-moving machines in Magadanskaya Oblast. The wear of piston rings in the engine parts and transmission assemblies was less when using domestic oils than when using the imported oils. The piston grooves wear to the same extent during operation of engines using both imported and domestic oils. The wear of crank bushings is less by mass when using domestic oils than imported oils. The crank pins, cylinder liners, turbocompressor parts, transmission pump and gearbox wear at the same rate when operating on both domestic and imported oils. Domestic oils showed a number of advantages over imported oils.
[13-6521]

UDC 665.635:665.644.2

PRODUCTION OF GASEOUS OLEFINS DURING CRACKING ON A ZEOLITE CATALYST

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 10, 1980 pp 10-12

GAYRBEKOV, T. M., DOROGOCHINSKIY, A. Z. and ZHAVORONKOV, M. N., Groznyy Petroleum Institute

[Abstract] The possibility of producing propylenes and butylenes as one of the main products of catalytic cracking at temperatures of 475-550° C and volumetric feed rates of 2-50 hr^{-1} was investigated. Vacuum gas oil with boiling point of 265-480° C, produced during cracking of high-paraffin Ozek-Suat oil with approximately 84 percent paraffinic haphthenic and approximately 16 percent aromatic hydrocarbons, was used as the feed stock. LaY zeolite, granulated without binders, with 45 percent zeolite phase after thermovapor treatment, was used as the catalyst. An increase of both temperature and bulk feed rate of the feed stock contributes to a significant increase of propylene and butylene in the cracking gases and also contributes to a decrease of the specific hydrocarbon content, mainly isobutane and propane. The yield of olefins passes through a maximum; this maximum then shifts toward higher values of feed stock conversion as temperature increases. The use of zeolite catalysts with high crystalline phase content in combination with increased temperatures and bulk feed rates of stock permits a significant increase of yield of both gasoline and gaseous

olefins of hydrocarbons with moderate coking when cracking heavy vacuum gas oil. Figures 2; references: 4 Russian, 1 Western.
[13-6521]

UDC 665.642:542.92

SELECTING THE CONDITIONS FOR THERMAL CRACKING OF PARAFFINS TO PRODUCE ALPHA-OLEFINS

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 10, 1980 pp 3-7

GERASICHEVA, Z. V. and SOSKIND, D. M., All-Union Scientific Research Institute of the Petroleum Industry

[Abstract] The conditions for cracking solid and liquid paraffins under which the yield of alpha-olefin fractions is maximum and the content of harmful impurities of diene, cycloolefin, C_nH_{2n-4} and aromatic hydrocarbons is least, were determined. The effect of the oil content in the paraffin on the quality of specific products was investigated. Solid and crude paraffins with oil content of 0.3-2.4 and 6.2 percent by weight were used as stock. Temperature variation in the range of 525-575° C has essentially no effect on the yield of specific fractions, but does affect the quality. The total content of diene, cycloolefin and C_nH_{2n-4} hydrocarbons in the fractions decreases by an average of 35 percent with an increase of temperature. High-temperature, purely vapor phase cracking of paraffin is recommended as the most effective method of producing alpha-olefins. The principles of designing a multisectional furnace which provides heating to 600° C with duration of the product in the reaction coil for 0.35-0.38 second were developed. Figures 4; references 9: 6 Russian, 3 Western.
[13-6521]

UDC 66.061.3

REMOVAL OF SULPHUR-AROMATIC CONCENTRATES FROM DIESEL FRACTIONS BY PHENOL EXTRACTION

Moscow NEFTEKHIMIYA in Russian No 4, 1980 pp 607-611 manuscript received 18 Jun 79

PAIS, M. A., BOGDANOV, V. S., BONDARENKO, M. F. and PORTNOVA, T. V., Scientific Research Institute of Petrochemical Products, Ufa

[Abstract] Concentrates with maximum sulfide sulphur content were removed from the diesel fraction of Arlan oil by phenol extraction and the results were compared to extraction by furfurol. Furfurol was taken for comparison as the most widely used solvent not containing -OH and $-NH_2$ groups. An increase of the number of contact stages and multiplicity of the flushing solvent, a decrease of the multiplicity factor of phenol and content of water in it are required

to increase the content of sulfide sulphur in the extract. The greatest increase of sulfide sulphur content in the extract is achieved at a yield of 15-20 percent. The content of thiophenes and monocyclic aromatic and paraffinic-naphthenic hydrocarbons in the extract increases with a further increase of yield. A significant part of the sulfides remains in the raffinate at low yields of extract. The fraction of bicyclic aromatic hydrocarbons and benzothiophenes increases correspondingly in the extract. Phenol extracts 50-60 percent of sulfides in the diesel fraction. Figures 1; references 6 Russian.
[15-6521]

UDC 665.61

ISOLATION OF NONHYDROCARBON COMPONENTS OF PETROLEUM AND PETROLEUM DISTILLATES BY COMPLEXING WITH TITANIUM TETRACHLORIDE

Moscow NEFTEKHIMIYA in Russian No 4, 1980 pp 603-606 manuscript received 13 Feb 79

GONCHAROV, I. V. and KULACHENKO, V. I., West Siberian Scientific Research Geological-Prospecting Petroleum Institute, Tyumen'

[Abstract] The completeness of titanium tetrachloride extraction of different classes of heteroatomic compounds from the main petroleum distillates produced by industrial refining of oil was investigated. Different heteroatomic components of oil produced from its distillates and gudron were separated with titanium tetrachloride. Both basic and neutral nitrogen compounds were extracted completely from petroleum distillates with boiling points up to 500°. A total of 87 percent of nitrogen bases and a total of 74 percent of neutral nitrogen compounds were extracted from gudron, while a total of 88 and 83 percent, respectively, were extracted from petroleum. Sulphur compounds were completely removed only from fractions with boiling points up to 240° and the degree of extraction decreased sharply with increasing boiling point of the distillates. Sulfides were most completely extracted among the sulphur-containing compounds. References: 9 Russian.
[15-6521]

UDC 547.21:541.127:66.094.524.5

COMPARATIVE REACTIVITY OF n-PARAFFINS IN THE SULFOOXIDATION REACTION

Moscow NEFTEKHIMIYA in Russian No 4, 1980 pp 594-598 manuscript received 16 Apr 79

SAITOVA, M. A., KHALIMOV, R. F., SHAFIKOV, N. Ya. and KASYMOVA, N. Kh., Institute of Chemistry, Bashkir Branch, USSR Academy of Sciences, Ufa

[Abstract] The comparative reactivity of n-paraffins during sulfooxidation at 70° C was studied. The rate of sulfooxidation is directly proportional to the rate of initiation. The significance of the rate of sulfooxidation decreases

as the S/v ratio increases. The decrease in reaction rate on transition from lower to higher paraffins is related to competing reactions. Figures 4; references 13: 7 Russian, 6 Western.
[15-6521]

UDC 662.749:542.943

OXIDATION OF ASPHALT BY OZONATED OXYGEN

Moscow NEFTEKHIMIYA in Russian No 4, 1980 pp 587-593 manuscript received 20 Apr 79

ISTAMBAYEVA, R. A., KHAYBULLIN, A. A. and KUDASHEVA, F. Kh., Bashkir State University imeni 40-letiya Oktyabrya and Bashkir State Pedagogical Institute, Ufa

[Abstract] The mechanism of reactions occurring upon interaction of asphalt produced from the bottom stock of gas pyrolysis with ozone and oxygen was investigated. The byproducts of ozonation are peroxides, acids and carbonyl compounds. Ozonation increases the rate of decarboxylation and decarbonylation. The accelerating effect of preliminary treatment of asphalt with ozone is altered toward formation of peroxide, carboxyl and carbonyl groups upon ozonation. The peroxides play the role of radical initiators which attack the acids and carbonyl compounds. Free radicals are formed when the asphalt molecules are attacked by oxygen upon oxidation of nonozonated pitch. Figures 4; references 11: 9 Russian, 2 Western.
[15-6521]

UDC 547.592.12:542.943

EFFECT OF ALKYLBORATES ON THE DECOMPOSITION OF CYCLOHEXYLHYDROPEROXIDE DURING LIQUID-PHASE OXIDATION OF CYCLOHEXANE

Moscow NEFTEKHIMIYA in Russian No 4, 1980 pp 568-572 manuscript received 13 Mar 79

PEK LAK VON, ITSKOVICH, V. A. and POTEKHIN, V. M., Leningrad Technological Institute imeni Lensovet

[Abstract] The kinetics and composition of cyclohexylhydroperoxide decomposition products in the presence of orthoboric and metaboric acids were investigated. Borates accelerate hydroperoxide decomposition and increase the yield of cyclohexanol. Metaborates are more efficient catalysts than the corresponding orthoborates. Radical breakdown of hydroperoxide comprises 6-12 percent of the total rate of decomposition in the presence of alkylborates. The main route of the reaction is interaction of the hydroperoxide with the solvent, which proceeds through the nonradical mechanism and leads to formation of two alcohol molecules, one from the hydroperoxide and one from the solvent. Figures 3; references 20: 14 Russian, 6 Western.
[15-6521]

UDC 547.315.2:547.451.542.943

FORMATION OF CARBONYL COMPOUNDS DURING AUTOOXIDATION OF ISOPRENE

Moscow NEFTEKHIMIYA in Russian No 4, 1980 pp 554-558 manuscript received 20 Nov 79

KUZNETSOVA, Ye. V., MIL'KINA, T. N., MORZHAKOVA, T. M., TARANENKO, S. A., KUDINOVA, L. M. and BATALIN, O. Ye., All-Union Scientific Research Institute of Petrochemical Processes, Leningrad

[Abstract] Eight carbonyl compounds, five of which are identified, were found during oxidation of isoprene. Formaldehyde, methylacrolein, methylvinylketone, methylisopropylketone and four carbonyl-containing polyfunctional compounds, one of which was isolated and identified as an oxycarbonyl compound of formula $C_5H_8O_2$, were found upon autooxidation of isoprene. Significant changes in the composition of carbonyl compounds occur under temperature conditions close to rectification of isoprene. Methylvinylketone and methylacrolein are subject to 100 percent conversion. The number of polyfunctional compounds, formaldehyde and methylisopropylketone increases significantly. An oxycarbonyl compound is formed by a hydroperoxide without breaking of the carbon-carbon bonds upon autooxidation of isoprene. Methylacrolein and methylvinylketone are formed upon decomposition of polymer peroxides with splitting of formaldehyde by 1,2- and 3,4-bonds. References 11: 10 Russian, 1 Western.
[15-6521]

UDC 547.56:541.127:621.892.099.6

CONDENSATION REACTION OF 2,6-DI-TETRA-BUTYLPHENOL AND FORMALDEHYDE

Moscow NEFTEKHIMIYA in Russian No 4, 1980 pp 549-553 manuscript received 11 Mar 79

VOLOSHCHUK, L. L., LYAKHOVICH, G. I., BEZDENEZHNYKH, A. A. and POTEKHIN, V. M., Leningrad Experimental Petroleum Oil Plant

[Abstract] Condensation of 2,6-di-tetra-butylphenol and formaldehyde was investigated in an ethyl alcohol medium. The reaction proceeds by a complex mechanism with formation of two intermediate products, 4-oxy-3,5-di-tetra-butylbenzyl alcohol and its ethyl ester. The relationship of the parameters of the process and the composition of the reaction mass in the ethyl alcohol medium is described by a derived system of differential equations. The main trends of the process are retained in propyl, isopropyl and methyl alcohol medium. Use of isopropyl alcohol as a solvent instead of ethyl alcohol permits an increase in the yield and purity of the entire product and a reduction of the sensitivity of the process to excess formaldehyde. Figures 1; references 6 Russian.
[15-6521]

UDC 547.659.1:542.92

THERMAL DECOMPOSITION OF TETRALIN

Moscow NEFTEKHIMIYA in Russian No 4, 1980 pp 539-544 manuscript received 27 Nov 79

KORZUN, N. V., MAGARIL, R. Z., TRUSHKOVA, L. V. and CHUNIKHINA, O. V., Tyumen' Industrial Institute

[Abstract] Thermal reactions of one of the simplest nephthenic-aromatic hydrocarbons, tetralin, were studied in the temperature range of 620°-700°. Investigation of the effect of ethylene on the rate of decomposition of tetralin showed that the reaction rate increases with an increase of ethylene additive. A scheme is proposed for the chain mechanism of reaction, which assumes bimolecular initiation of chains after the induction period associated with accumulation of ethylene.
[15-6521]

UDC 547.313.3:542.952

DIMERIZATION OF PROPYLENE ON NICKEL CATALYSTS IN THE PRESENCE OF SOLVENTS OF DIFFERENT NATURE

Moscow NEFTEKHIMIYA in Russian No 4, 1980 pp 534-538 manuscript received 16 Nov 78

NIKONOVA, T. N., TKACH, V. S., SHMIDT, F. K. and MOISEYEV, I. I., Irkutsk State University imeni A. A. Zhdanov

[Abstract] The effect of solvents on the properties of a nickel catalyst during dimerization of propylene was investigated. The nature of the solvent considerably influences the activity and selectivity of complex nickel catalysts in the propylene dimerization reaction. Hydrogen halides participate efficiently in regeneration of catalytic complexes and contribute to side cationic oligomerization of propylene. An active and stable catalyst based on bis-acetylacetonate of nickel and diisobutylaluminum chloride is produced when paraffin hydrocarbons are used as a solvent. Figures 1; references 9: 8 Russian, 1 Western.
[15-6521]

UDC 547.592.3:542.941

HYDROGENATION OF CYCLIC DI-, TRI-, AND TETRAENES INTO CYCLENES

Moscow NEFTEKHIMIYA in Russian No 4, 1980 pp 518-522 manuscript received 19 Jul 79

PERCHENKO, V. N., MIRSKOVA, I. S. and NEMETKIN, N. S., Institute of Petrochemical Synthesis imeni A. V. Topchiyev, USSR Academy of Sciences

[Abstract] Methods of synthesis were developed and a new type of macromolecular complex compounds based on polyethyleneimines and halogenide metals was found. Investigation of the properties of coordination compounds of polyethyleneimines established that they have rather high thermooxidative stability and are inert to the effect of acid reagents. Their interaction with strong bases leads to breakdown of the coordination bonds, while the macroligand remains unchanged. Macromolecular complexes of polyethyleneimines (branched, linear and acylated) with palladium chloride were found which are catalysts for hydration, isomerization and redistribution of hydrogen. Palladium complexes of polyethyleneimine are efficient catalysts of selective hydration of cyclopolyenes to cyclenes. Figures 1; references 8: 6 Russian, 2 Western.
[15-6521]

UDC [547.659.1+547.665+547.672.2+547.677.3]:541.128

TRANSFORMATIONS OF SOME CONDENSED AROMATIC HYDROCARBONS IN THE PRESENCE OF THE ZIRCONIUM-NICKEL-HYDROGEN CATALYTIC SYSTEM

Moscow NEFTEKHIMIYA in Russian No 4, 1980 pp 514-517 manuscript received 5 Sep 79

RAKHAMIMOV, B. Yu., ERIVANSKAYA, L. A. and LUNIN, V. V., Moscow State University imeni L. M. Lomonosov

[Abstract] The high catalytic activity of intermetalide hydrides based on zirconium was investigated in reactions of more complex aromatic hydrocarbons and specifically of condensed aromatic systems. The zirconium-nickel-hydrogen system under pulse mode conditions manifests high catalytic activity in transformations of indane, naphthalene, tetralene, octahydrophenanthrene and octahydroanthracene. Naphthalene is selectively hydrated at 180-310° with formation of cis- and trans-decalins and tetralins. Partially hydrated aromatic hydrocarbons go into dehydration and hydrogenolysis reactions at 250-450°. Hydrogenolysis occurs primarily through bonds not adjacent to the aromatic ring. Figures 1; references 4 Russian.
[15-6521]

UDC 665.61

CONCERNING THE CONVERSION OF OILS IN NATURE AND THEIR CLASSIFICATION

Moscow NEFTEKHIMIYA in Russian No 4, 1980 pp 505-513 manuscript received 13 Feb 79

KURBSKIY, G. P., Institute of Organic and Physical Chemistry, Kazan' Branch, USSR Academy of Sciences, Kazan'

[Abstract] Chemical classification of oils finds application for preliminary grading prior to detailed investigation. However, more widespread practical use of it is hardly possible for geochemical and production purposes since it disregards the types of filtered oils and gas condensates. This classification also does not permit identification of the types of catagenically and hypergenically altered oils and does not take into account such important characteristics of chemical composition as the content of heteroatomic compounds and light fractions. A scheme is presented for converting oils in nature which can be the basis for developing a rational classification of oils that permits prediction of their main chemical and technological properties based on geochemical data. References 21: 17 Russian, 4 Western.
[15-6521]

UDC 665.7.033.2:66.081.3:621.384.8

HIGH-BOILING NAPHTHENE-PARAFFIN HYDROCARBONS OF PETROLEUM

Moscow NEFTEKHIMIYA in Russian No 4, 1980 pp 498-504 manuscript received 13 Jun 79

SERGIYENKO, S. R., NIYAZOV, B. G., AYDOGDYYEV, A. A. and POLYAKOVA, A. A., Institute of Chemistry of the Turkmen SSR Academy of Sciences and All-Union Scientific Research Institute on Oil Refining

[Abstract] New data which characterize the molecular structure of naphthene-paraffin hydrocarbons were obtained by combining the object of investigation with a combination of methods of separation, differentiation and study of hydrocarbons of hybrid structure. Saturated naphthene-paraffin hydrocarbons separated from 50-degree fractions of oils which boil in the range of 300-500° were the object of investigation. Isoparaffin hydrocarbons investigated under X-radiation by the capillary gas-liquid chromatography method were represented mainly by isoprenes. Paraffin-naphthene hydrocarbons of medium petroleum fractions can be differentiated by the degree of cyclicity and condensation of molecules through complexing with thiocarbamide. Figures 3; references 3 Russian.
[15-6521]

UDC 547.52/59

MONOAROMATIC OIL HYDROCARBONS OF STEROID TYPE

Moscow NEFTEKHIMIYA in Russian No 4, 1980 pp 490-497 manuscript received 22 Aug 79

ZUBENKO, V. G., PUSTIL'NIKOVA, S. D., ABRYUTINA, N. N. and PETROV, A. A., Institute of Geology and Exploitation of Fuel Minerals

[Abstract] Monoaromatic hydrocarbons of steroid structure with boiling points above 420° in oils of different chemical composition were determined and identified by gas-liquid chromatography and by chromato-mass-spectrometric methods. A homologous series of monoaromatic steranes of composition C_{27}-C_{29} was studied and their genetic relationship to hydrocarbons of the sterane series is indicated. Aromatization of initial bioorganic compounds begins primarily with ring C and results in intramolecular regrouping of methyl radicals from positions 10 and 13 to positions 5 and 12. Diastostereomers with cis-connection of rings A/B are formed. Standard mixtures of monoaromatic hydrocarbons of the sterane type were produced by dehydration over platinum/charcoal and by catalytic conversion of steroids over alumosilicates. A group of compounds related to 4-methylsteranes was also found in small concentrations. Figures 1; references 7: 3 Russian, 4 Western.
[15-6521]

UDC 547.59:665.61

MONOCYCLIC ALCANES OF ISOPRENE STRUCTURE IN OIL OF THE KARAZHANBAS FIELD

Moscow NEFTEKHIMIYA in Russian No 4, 1980 pp 483-489 manuscript received 3 Jul 79

VOROB'YEVA, N. S., ZEMSKOVA, Z. K. and PETROV, A. A., Institute of Geology and Exploitation of Fuel Minerals

[Abstract] A homologous series of monocyclic hydrocarbons, with the exception of hydrocarbons of composition C_{12} and C_{17}, was found in oil of the Karazhanbas field. Monocyclanes of C_{10}-C_{22} composition belonging to the homologous series of trans-1,1,3-trimethyl-2-alkylcyclohexane were identified in the oil of the Karazhanbas field by the chromato-mass-spectrometric method. The alkyl substitute in the hydrocarbons has an isoprene structure, beginning with C_{14}. The indicated hydrocarbons were identified by countersynthesis of some reference compounds. The mass spectra of reference and petroleum hydrocarbons are given and possible methods and sources of their formation under natural conditions are discussed. The presence of appreciable quantities of hydrocarbons whose source was squalene was also noted in addition to ordinary isoprene alcanes. Compounds of 2,6,10-trimethyltetradecane and 2,6,10-trimethylhexadecane were identified. The B_{15} and B_{16} structures belong to bicyclic isoprenes considered previously. Figures 2; references 5: 3 Russian, 2 Western.
[15-6521]

UDC 665.12,636.087.24,002.67

SEPARATION OF FATTY ACIDS AND OTHER PRODUCTS FROM MICROBIAL FAT

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 8, 1980 pp 40-42

VOLKOVA, L. D., KAZANTSEV, Yu. Ye., LEVCHENKO, O. A., BORDYUG, M. P. and DROZDOV, A. S., Volgodon Branch of All-Union Scientific Research Institute of Surfactants

[Abstract] Microbial fat, a specific substance distinguished from known vegetable oils and fats, is separated from the biomass of microorganisms by extraction. It contains a large number of phospholipids and free fatty acids, the content of which fluctuates over a wide range. Microbial fat is refined by two methods. In the first method the phospholipids are hydrated with water and refined by alkali from free fatty acids. The hydrocarbons are then distilled with vapor from neutral fat with production of powdery feed phosphotites, acids for toilet soap production and refined yeast fat. In the second method the hydrocarbons are removed by adsorption. A third method for refining microbial fats is based on the insolubility of phospholipids in acetone. The mixture is then left to settle for one hour. The precipitate is dissolved in petroleum ether. The acids distilled from microbial fat produced positive results upon testing. It is recommended that they be used in the tire industry and that they be used instead of coconut oil to manufacture toilet soap.
[16-6521]

UDC 66.047.3,665.123.2.095.192.5

CONTINUOUS DISTILLATION OF HYDROCARBONS FROM ALKYLBORATES IN A FILM DISTILLATION APPARATUS

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 8, 1980 pp 36-37

IL'INA, A. I., TROSHEN'KIN, B. A., PERCHENKO, A. A. and SNEGUR, V. K., Institute of Machine-Building Problems, UkSSR Academy of Sciences

[Abstract] An apparatus with an incident film was used to distill hydrocarbons from alkylborates. Approximately the same amount of hydrocarbons was distilled to evaluate the operation of the film distiller under laboratory conditions and they were compared to indicators of hydrocarbons produced on an experimental installation. Positive results are achieved at feed rate of 180 liters/hour into the distiller and distillation of 80-90 liters/hour of hydrocarbons during distillition of hydrocarbons from the esterified product of the third fraction. Approximately 65 percent of the hydrocarbons contained in the esterified product can be distilled in a film distiller.
[16-6521]

UDC 665.7.032.57.004.14,691.58

ROOF MASTIC BASED ON SHALE PRODUCTS

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 8, 1980 pp 31-32

SHUL'MAN, A. I., FEDOROVA, G. P. and ZUYEVA, V. A., Slantsy Shale Refining Plant

[Abstract] BLK mastic was developed at the central laboratory of the Slantsy Shale Refining Plant. It is based on shale bitumen products and butadiene-styrene latex that does not contain solid ingredients. The mastic is produced in a reaction vessel where lacquer and bitumen are poured from metering devices in sequence. Latex is added to the reaction vessel after careful mixing of the ingredients and the viscosity of the mass is determined. A solvent is added if the mastic concentration is above the norm. The cold tolerance, minimum temperature range of crack formation in the mastic layer during bending and separation strength during shearing were also investigated.
[16-6521]

UDC 661.722,665.652.4

FORMATION OF ETHYL ALCOHOL DURING ETHYLENE ALKYLATION OF BENZENE

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 8, 1980 p 31

MAMEDOV, A. A., KARLOVA, G. A. and PINSKER, A. Ye., Dzerzhinsk Industrial Institute

[Abstract] Ethyl alcohol was formed experimentally during ethylation of hexaethylbenzene in the presence of aluminum chloride with subsequent separation of the complex by a wet inert gas. The solubility of the aluminum chloride complexes in the alkylate in the presence of water and ethyl alcohol was checked. The complex is highly soluble in the presence of alcohol, which causes additional losses of the catalyst.
[16-6521]

UDC 66.095.253.73:546.161,66.011

INSTALLATION FOR HYDROGEN FLUORIDE ALKYLATION OF ISOBUTANE BY OLEFINS

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 8, 1980 pp 24-26

SIDOROV, V. A., TREYGER, L. M., SHEVKUNOV, N. D., GIL'CHENOK, N. D., GUSHCHEVSKIY, A. B. and MAKAROVA, L. I., All-Union Scientific Research Institute of Petrochemical Processes

[Abstract] A laboratory installation developed to study hydrogen fluoride alkylation of isobutane by olefins is described. An autoclave with cooling sleeve is used as the reaction vessel. Aluminum oxide roasted at 550° C is used to dry the initial raw material and nitrogen. The catalyst is anhydrous hydrogen fluoride fed to the installation through an intermediate tank and buret with electronic level indicator. The initial hydrocarbons contained impurities of other hydrocarbons. The yield of alkylate at five atmospheres, temperature of 10° C and isobutane: isobutylene ratio of 2.5: 1 was reached at the rate of that calculated theoretically for olefin. The reaction products consisted almost completely of paraffin hydrocarbons. The apparatus developed for hydrogen fluoride alkylation also can be used to investigate super acid catalytic systems with fluorosulfonic acid as the catalyst.
[16-6521]

UDC 620.197.6,629.11.011.6

PROTECTIVE COATING FOR THE BOTTOM OF AUTOMOBILES

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 8, 1980 pp 22-24

GUREYEV, A. A., SPIRKINA, N. P., TIMOKHIN, I. A., SHEKHTER, Yu. N., BAKALEYNIKOV, M. B. and KOPYLOV, L. I., Moscow Institute of the Petrochemical and Gas Industry imeni Academician I. M. Gubkin

[Abstract] The inhibitor NGM-chassis coating, designed for anticorrosion treatment of the bottom of automobiles, was investigated. The protective properties were evaluated from the results of accelerated tests in different aggressive media and also by determining the corrosion rate with respect to variation of polarization resistance. NGM-chassis coating was compared to textile-122A and NG-216A coatings and BPM-1 mastic. NGM-chassis coating has superior protective properties under salt mist conditions and is as good as textile-122A in a sodium chloride solution. The coating meets the requirements placed on coatings for corrosion protection of the bottom of automobiles in drop temperature. NGM-chassis mastic is abrasion resistant and exceeds all investigated coatings by this indicator.
[16-6521]

UDC 665.7.038.2,665.7.033,66.063.8

INVESTIGATING THE EFFECT OF THE TEMPERATURE OF MIXING COMPONENTS ON THE COMPOSITION OF VNII NP-360A ADDITIVE

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 8, 1980 pp 16-18

BOGDANOVA, G. F., KOTOVA, G. G., IVANOVA, Ye. A., ORLOVA, V. S., ZHAROVA, Ye. Ya. and TIMOSHENKOVA, Yu. D., All-Union Scientific Research Institute of the Petroleum Industry and Production Association "Gor'knefteorgsintez"

[Abstract] Barium alkylphenolate (additive VNII NP-350) was converted to oil-soluble form to increase the quality of VNII NP-360 additive. This contributed to a reduction of barium alkylphenolate losses when the additive was filtered and also to an increase of the alkalinity of the additive and the content of barium in it. The mixing temperature of both components (VNII NP-360 and VNII NP-350M additives) of VNII NP-360A additive was determined. Specimens produced at different mixing temperatures have approximately identical physicochemical and functional properties. Spectral investigations of specimens of the additive produced at different mixing temperatures were carried out to determine the effect of mixing temperature of the components on the composition of the additive. Changes occur both at room temperature and at elevated temperatures when the components are mixed. These changes are possibly due to chemical interaction of the components and rearrangement of the colloidal system of the additive. The changes are more marked at elevated temperatures. It is recommended that the components be mixed at 70° C when producing the VNII NP-360A additive. [16-6521]

UDC 665.7.038.2,(661.7'5.7:547.563):665.652.4,66.012.5

THE EFFECT OF THE QUALITY OF THE ALPHA-OLEFIN FRACTION ON THE CHEMICAL COMPOSITION AND YIELD OF ALKYLPHENOL IN PRODUCTION OF ALKYLSALICYLATE ADDITIVES

Moscow NEFTEPERERABOTKA I NEFTKHIMIYA in Russian No 8, 1980 pp 14-16

KULIKOV, A. A. and TENYUKOV, A. M., Novokuybyshev Petroleum Refinery

[Abstract] The effect of the fractional composition of alpha-olefins on the chemical structure and yield of alkylphenol, produced at an industrial alkylation installation in the presence of KU-2-8 cation exchanger, was determined. The individual hydrocarbon composition of the alpha-olefin fractions was determined by gas-liquid chromatography. If the fractional composition of the alpha-olefins is lightened, the content of 2,6-dialkylphenols increases in the alkylphenol and the content of the group of 2-mono- and 2,4-dialkylphenols decreases appreciably. Up to 20-25 percent of light fractions, consisting of 90-92 percent of C_9-C_{13} hydrocarbons, is accumulated in the circulating phenol. Accumulation of light fractions in the system reduces the activity of the catalyst due to blocking of active centers by them. Low-molecular olefins present in the alpha-olefin fraction, which is used to alkylate phenol in production of alkylsalicylate

additives, contributes to increased formation of undesirable structures, resination and reduction of catalyst activity. The alpha-olefin fraction of 240-320° C, strictly normalized in fractional composition and with content of no more than 8-10 percent of low-molecular hydrocarbons, should be used in production of alkylsalicylate additives.
[16-6521]

UDC 665.658.2.013.004.68,665.635:621.436,621.928.1

USING HOT SEPARATION LAYOUTS AT THE INSTALLATION FOR HYDROFINING OF L-24-6 DIESEL FUEL OF THE RYAZAN' OIL REFINERY

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 8, 1980 pp 7-10

LUGOVSKOY, A. I., ISAYEV, B. N., MINCHENKOV, V. T. and TISHKIN, V. V., Ryazan' Petroleum Refinery

[Abstract] Hot separation of the gas-product mixture has been proposed to intensify hydrofining of L-24-6 diesel fuel. Versions of hot separation of the gas-product mixture were calculated at 170, 230 and 280° C with identical parameters of the technical conditions of the reactor block and of stabilization and of the designed heat-exchange surface were calculated to evaluate the efficiency of schemes for hot separation of the gas-product mixture compared to the design variant. The amount of heat transmitted in the heat exchangers of the reactor block decreases with an increase of hot separation temperature due to a decrease of the temperature difference of the flows. The amount of heat removed in the coolers of this block also decreases since an even greater amount of heat is transmitted to the stabilization block with flow of diesel fuel directly from the hot separator. An increase of the degree of heat recovery leads to a decrease of the thermal output of furnaces, which in turn permits intensification of the diesel fuel hydrofining installation without increasing the initial thermal output of the furnaces. The vapor phase of the hot separator is cooled to 40-50° C in the air-cooling apparatus and is then sent to the cooling apparator. The liquid phase, which is lightweight diesel fuel, is sent from the cold separator to the fifth plate of the stabilization column as intermediate irrigation, which permits a decrease of thermal load on the cooling condensor of the stabilizer. Hydrofined diesel fuel produced by hot separation shows lower density, lower sulphur content and lower boiling point at all temperatures compared to crude oil and cold-separated diesel fuel.
[16-6521]

UDC 66.095.13.001.5:547.462.3-312:541.127

THE EFFECT OF ALCOHOL TYPE IN THE SYNTHESIS OF UNSYMMETRICAL ESTERS OF MALEIC ACID

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian Vol 10, 1980 pp 32-33

BELOV, P. S., ZAVOROTNYY, V. A. and KORENEV, K. D., Moscow Institute of the Petrochemical and Gas Industry imeni Academician I. M. Gubkin

[Abstract] In connection with the synthesis of new antiwear compounds the reaction of maleic anhydride with various alcohols was studied. Second order rate constants at 60°, 80°, and 90° activation energies were determined for 2-ethyl-hexa-1-ol, p-cresyl ethyleneglycolate and p-tert-hexyl-O-methylphenyl ethyleneglycolate. Rate constants were also found for the O-methylphenyl di- and tri-ethyleneglycolates and for the reaction of 2-ethylmalenate with 2-ethylhexa-1-ol and o- and p-terhexyl-O-methylphenylethyleneglycolate. Correspondance with acidity was observed. However the differences were small in all cases. The data indicate that one stage synthesis of unsymmetrical esters of maleic acid should be possible.
[22-12126]

UDC 665.658.2:66.097.3:665.635-404.002.32:665.6.033.52

THE HYDROREFINING OF THE 200-320°C RAW MATERIAL FRACTION BY THE PAREX PROCESS

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian Vol 10, 1980 pp 28-29

OSIPOV, L. N., AGAFONOV, A. V., ALIYEV, R. R., NEFENOV, B. K., TUROVSKAYA, L. V. and KOGAN, V. S., All-Union Scientific Research Institute of the Petroleum Industry

[Abstract] The use of GK-35 catalyst in hydrofining paraffin production, in place of AKM or ANM, was found to permit specific feed rates of raw material from three or four times higher, with lower hydrogen partial pressure. Temperatures of 355-380° C, hydrogen partial pressures of 2.2-2.5 Megapoise, and hydrogen flow rates of 200-400 nm^3/m^3 of raw material were used. The product obtained met all quality requirements except density. The relatively high distillation stabilization output of 4% was due to the need for a more vigorous initial boiling of the useful product.
[22-12126]

UDC 665.635-404.002.33:665.637.733:665.663.4:66.012.5

THE EFFECT OF RAW MATERIAL QUALITY ON THE YIELD AND QUALITY OF PARAFFIN OBTAINED WITH TYPE G-64 APPARATUS

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 10, 1980 pp 25-26

ODINTSOV, O. K., LEVIN, A. I., RYKOV, S. Ya., MARTYNENKO, A. G., DORODNOVA, V. S., MARTIROSOV, R. A., KONOPLEV, V. P. and BELOUSOV, A. N., Groxnenskiy Petroleum Scientific Research Institute

[Abstract] The effect of diesel fuel feed stock prepared from a mixture of secondary and tertiary stripping distillates, on paraffin yield and quality was investigated. The presence of resinous, unsaturated and sulfur-containing substances was one of the major causes of low yield, due to adsorption on the circulating carbamide. The use of vacuum gas oil in the feed stock led to increased sulfur, unsaturated hydrocarbons and water in the paraffin, and is therefore not recommended. Feed stock production was optimized to minimize unsaturated hydrocarbon and sulfur content. In this manner paraffin yield was increased to 10% and its purity to 97-99 mass %.
[22-12126]

UDC 665.7.038.64:665.7.035.6

POLYMERIC VISCOSITY ADDITIVES TO LUBRICATING OIL

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 10, 1980 pp 23-24

LUN'KOV, Yu. V., SUDOROVA, I. K., TURSKIY, Yu. I., KHURUMOVA, A. F. and NAZAROVA, T. I., All-Union Scientific Research Institute of the Petroleum Industry

[Abstract] Methods for increasing the stability of polymeric lubricant additives are discussed and the Western patent number of each is given. The use of antioxidants such as tri-(2-ethylhexyl)-phosphate and narrow molecular mass distributions increase thermal and mechanical properties, respectively. Polymethacrylate, polyisobutylene, ethylene-propylene copolymers, alkylmethacrylate, alkylacrylate, selectively hydrated styrol-butadiene copolymers and low molecular weight thickeners have been proposed. Polymethacrylate copolymers with monomers like alpha-alkylenes have been used in mineral oil. Copolymers with nitrogen-containing monomers like N-vinyl-2-pyrrolidone and dialkylaminoalkyl methacrylate improve viscosity and dispersiveness and sometimes oxidation resistance. Ethylene-propylene and their oxidation products, hydrogenated polybutadiene and isoprene-butadiene copolymers are possible substitutes for polymethacrylate, particularly in diesel engines. Aromatic hydrocarbons, particularly styrol and diolefins, are also used. Diesters of polyoxyalkylene glycol, complex esters of C_2-C_{22} aliphatic alcohols and polyalkylenesuccinic acid, halogen-containing copolymers and special structural placement of monomers are being investigated.
[22-12126]

UDC 665.642-986-404:661.716.2.34.34-125:665.652.4:66.012.5:661.715.272-125

AN EXPERIMENT ON THE TREATMENT OF THE BUTYLENE-ISOBUTYLENE PYROLYSIS FRACTION USING ALKYLATING APPARATUS

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 10, 1980 pp 7-8

ZELINSKAYA, L. I., BREYZE, A. A., MATVEYEV, A. I. and YATSENKO, G. A., Omsk Petroleum Organic Synthesis Processing Station

[Abstract] Treatment of a butylene-isobutylene pyrolysis fraction in a sulfuric acid catalyst alkylating apparatus modified for high efficiency, permits processing 350-400 tons/day. The presence of divinyl has a negative effect on the process due to catalyst breakdown. The reaction temperature was 10-15° C, acid-hydrocarbon ratio 1:1 and contact time 14-17 minutes. The octane number of the gasoline produced was 91-92. The pyrolysis fraction was added at levels of 15-25% to cracking fractions and isobutane. This did not affect the function of the apparatus. Figures 1.
[22-12126]

POLYMERS AND POLYMERIZATION

UDC 541.64:620.192.5

ON THE QUESTION OF POLYMER SWELLING IN VAPORS OF LOW-MOLECULAR LIQUIDS, ACCORDING TO THE EXAMPLE OF POLYSTYRENE-POLYBUTADIENE BLOCK COPOLYMERS

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian No 6, 1980 pp 1347-1358 manuscript received 18 Apr 79

ZUBOV, P. I., MATVEYEV, Yu. I., ASKADSKIY, A. A. and ANDYUSHCHENKO, T. A., Institute of Physical Chemistry, USSR Academy of Sciences, Moscow

[Abstract] Mathematical formulas are offered to describe the curves of kinetic swelling effects based on structural changes and the elimination of the solvents, which in turn cause the destruction of intermolecular bonds. Maximum values of the curves are related to phase transformations such as crystallization or other types of ordering of molecules. Isooctane was determined to be a selective solvent for polybutadiene blocks and a precipitating agent for polystyrene blocks. The tests performed showed that the swelling process was related to relaxational phenomena that led to characteristic curves of kinetic swelling results. The kinetics are shown by a model that has two typical retardation periods, and the sorption process is accompanied by large periods of relaxation of the bonds in the polymers. Figures 4, formulas 36, references 10 in Russian.
[226-12131]

UDC 577.152:547.458.81:547.992.3

THE EFFECT OF THE PRODUCTS OF LIGNIN ALKALINE DESTRUCTION ON THE FERMENTATIVE HYDROLYSIS OF CELLULOSE

Riga KHIMIYA DREVESINY in Russian No 3, May-Jun 80 pp 114-116 manuscript received 28 Jan 80

KATKEVICH, R. G., KATKEVICH, Yu. Yu., BALODE, B. K. and ZAKIS, G. F., Institute of Wood Chemistry, Latvian SSR Academy of Sciences

[Abstract] The effect of various model compounds, representing the low molecular weight substances formed from lignin by alkaline hydrolysis, on the activity of cellulase A was studied using cotton linter. It was found that phenol, vanillic

alcohol and p-hydroxybenzoic acid significantly inhibit enzyme activity at 0.1 mmole and acetovanillon, guaiacol and vanillic acid inhibit at 1.0 mmole. The data indicate that these compounds can decrease microorganism biomass yield from alkaline-treated straw and may be the reason why subsequent water washing has been recommended. References 6: 3 Russian, 3 Western.
[232-12126]

UDC 541.64:634.0.812:547.538.141

THE MODIFICATION OF WOOD SAWDUST WITH POLYSTYRENE. 3. THE EFFECT OF VARIOUS PLASTICIZERS ON PLASTIC PROPERTIES

Riga KHIMIYA DREVESINY in Russian No 3, May-Jun 80 pp 108-111 manuscript received 30 May 79

PAULS, R. R., ZOLDNERS, Yu. A. and SUTYAGINA, S. Ye., Institute of Wood Chemistry, Latvian SSR Academy of Sciences

[Abstract] The effect of dimethylphthalate, dibutylphthalate, tricresyl phosphate and chloroparaffin plasticizers, added to reduce internal stress, on the properties of polystyrene-birch sawdust plastics was studied. After an initial decrease, strength in static and dynamic flex tests was maximal at 7-10% dibutylphthalate. Compression resistance was decreased. Water abosrption increased only at 20% plasticizer. Plasticizers significancly decrease all the machanical characteristics or wood-polystyrene copolymerized with acrylic acid. For dimethylphthalate maximum static flex was achieved at 1%, while tricresyl phosphate gave the best results of all plasticizers tested, at a 5% level. Chloroparaffin showed the poorest compatibility. Fluidity in pressure casting and extrusion was significantly increased by the addition of 10% dibutylphthalate. Figures 4; references 7: 7 Russian.
[232-12126]

UDC 541.64:539.3

THE ROLE OF MECHANICAL LOADS IN LOW-TEMPERATURE OXIDATION OF POLYMERS: THE OZONE-OXYGEN EFFECT ON ISOTACTIC POLYPROPYLENE

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian No 6, 1980 pp 1366-1971 manuscript received 24 Apr 79

POPOV, A. A., KRISYUK, B. E. and ZAIKOV, G. Ye., Institute of Chemical Physics, USSR Academy of Sciences, Moscow

[Abstract] Tests were conducted on uninhibited isotactic polypropylene with intrinsic viscosity of 2.44 in decalin at 135° C. Films were prepared by compressing polypropylene powder on a cellophane substrate at 180° C and 150 atm to

form strips 5 to 40 microns in thickness. The specimens were then subjected to stress and ozone oxidation. It was shown that the oxidation rate increased in proportion to increases in stress. The limiting stage of oxidation was seen to be related to changes in the hydrocarbon chain from tetrahedral to trigonal forms. Tests without load confirmed the effects of load on ozone oxidation of the isotactic polypropylene. Deformation of up to 12% accelerated the rate of oxidation, but further deformation increased the orientation of molecules and made them more resistant to oxidation. Figures 6, references 14 in Russian. [226-12131]

RUBBER AND ELASTOMERS

UDC 678.84-14:678.046.3.004.12

THE INFLUENCE OF FILLERS ON THE PROPERTIES OF SINGLE-COMPONENT ORGANOSILICON COMPOSITIONS FOR COLD VULCANIZATION

Moscow KAUCHUK I REZINA in Russian No 9, 1980 pp 14-17 manuscript received 16 Jan 80

SEVERNYY, V. V. and KULESHOV, A. P.

[Abstract] The title study was carried out to improve the physical-mechanical properties of low molecular weight organosiloxane polymers vulcanized at room temperature. The fillers considered included zinc oxide, powdered quartz, titanium dioxide, chemically precipitated chalk, kaolin, and microtalc. The particles of each of the fillers were characterized by electron microscopic studies. The strength under tension of the material increased for volume concentrations of the fillers to about 0.2 parts by volume, then decreased. The strength above about 0.3 parts by weight was generally less than that of the pure polymers. The magnitude of the increase in strength decreased in the above order, e.g., zinc oxide caused the greatest increase, microtalc, the least. The relative elongation increased with increasing filler concentration C, for C less than about 0.35. The concentration of "effective" cross-linkages increased with increasing C. There is a decrease in the value of the volume swelling from about 6 to 3-4 cm^3/cm^3 for an increase in the filler from 0 to 0.4 parts by volume. The viscosity of the material increases with increasing C, especially above $C = 0.25$. Thus fillers can be used to improve the physical and mechanical properties of synthetic rubbers. The best all-around filler was the powdered quartz or, when high elasticity and strength characteristics were necessary, zinc oxide, at concentrations of 0.15-0.20 parts by volume. References 7: 6 Russian, 1 Western; Figures 3; Tables 1.
[24-12027]

UDC 678.743.41.002.612:541.6

RELATIONSHIPS OF SOME TECHNICAL PROPERTIES OF RUBBERS BASED ON COMPLETELY FLUORINATED CAOUTCHOUC TO THEIR STRUCTURAL PARAMETERS

Moscow KAUCHUK I REZINA in Russian No 9, 1980 pp 12-14 manuscript received 14 Nov 78

GRINBLAT, M. P., FOMICHEVA, M. M., SIDOROVICH, Ye. A. and GORDIYENKO, N. Ye., All-Union Scientific Research Institute of Synthetic Rubber imeni S. V. Lebedev

[Abstract] The title study was carried out using copolymers of tetrafluoroethylene and perfluoroalkyl vinyl esters. The structures of the copolymers were altered somewhat by varying the conditions for their synthesis. Based on the plots of elasticity, the copolymers were two groups, with the first group divided again into two subgroups. The first group begins to flow or disintigrate at either 120-130° C or 170-190° C, and the second group at 250-340° C. Copolymers of the first subgroup (120-130° C) were characterized by the elasticity parameters E_{min} = 6-7%, E_{max} = 30-37%, the dynamic modulus at room temperature E_{20} = 3.8-4.2 MPa, a low gel concentration (17-25 wt %) in the original sample, and a degree of structural formation in the range 1.35-2.35. The polymers of the 170-190° C subgroup were characterized by the following parameters: E_{min} = 11-19%, E_{max} = 42-59%, E_{20} = to 23 MPa, the gel concentration = 35-53%, and degree of structural formation = 1.8-2.5. The strength under tension of filled vulcanized rubber increases with increasing degree of crystallization as measured by E_{min} and increasing molecular weight as measured by E_{max}. Filled vulcanized rubber containing copolymers of the second group have an average or high molecular weight, a high gel concentration after heating, and stability to resist shrinking at 200° C in a kerosene environment. References 5: Russian; Figures 3; Tables 2.
[24-12027]

UDC (678.762.2:54-14).063.004.12:678.027.74

PROPERTIES OF CASTING RUBBERS FROM OLIGOMERS AND CO-OLIGOMERS OF BUTADIENE WITH TERMINAL CHLOROBENZOATE GROUPS

Moscow KAUCHUK I REZINA in Russian No 9, 1980 pp 8-10 manuscript received 5 Dec 79

CHIRIKOVA, Z. P., CHERNINA, V. M., GALATA, L. A. and KOPMAN, L. S., Scientific Research Institute of The Tire Industry

[Abstract] Consideration is given to some features in the synthesis and properties of the title materials for butadiene (OBKH) and its co-oligomers with styrene (OBSKH) or acrylic acid nitrile (OBNKH). The quaternary ammonium fragments formed during the chain elongation and cross-linking have a limited thermal stability. The degree of cross-linking of the oligomers is time dependent and an evaluation

of the maximum equilibrium swelling (Q) in benzene and the sol-fraction concentration (S) indicates that the rate of structure formation involving the oligomers increases significantly with a decrease in their molecular weight. At 80° C the structure formation proceeds repidly, increasing in the following order for the co-oligomers: OBKH > OBSKH > OBNKH. However, at 100° C, the hardening rates with hexamethylenediamine (HMDA) were practically the same for all the oligomers containing chloride. The properties of the resins prepared at 100° C were not as good as those of materials prepared at 80° C. Unfilled resins, prepared similarly, had practically the same values of strength under tension and resistance to tearing as the carbon-filled polymers based on OBSKH and OBNKH and prepared at 100° C. This suggests the lack of retrograde reactions during the cross-linking of the oligomers with the help of HMDA at temperatures to 100° C. References 8: 6 Russian, 1 Western; Figures 1; Tables 3.
[24-12027]

UDC 678.742.4-136.23.031

PROPERTIES OF EMULSIONS OF SOLUTIONS OF BUTYL CAOUTCHOUC CONTAINING MINERAL OIL IN ALCOHOL-WATER MIXTURES

Moscow KAUCHUK I REZINA in Russian No 9, 1980 pp 5-8 manuscript received 24 Dec 79

LAZURIN, Ye. A. and KOSMODEM'YANSKIY, L. V., All-Union Scientific Research Institute of Monomers for Synthetic Rubber

[Abstract] A study was made of an emulsion of cyclohexane solutions of high-molecular-weight butyl caoutchouc BK-1675T (average-viscosity molecular weight 2.1 X 10^5 with an intrinsic viscosity $\eta = 1.03$) containing the oil stabiloyl-18, in alcohol-water solutions of potassium oleate. The rate of formation, the distribution of the alcohol between the phases, surface tension, particle size, and polydispersion, and the stability (based on the sedimentation rate and agregate stability) were determined. The partition coefficient K of ethanol ranged from 0.1 at 0% oil concentration to 0.5 at 8% oil. From 0 to 6% oil, the increase is roughly linear (K = 0.1 to 0.3); the curve then steepens from 6% to 8% oil (K = 0.3 to 0.6). The viscosity of the emulsion increases both with the age of the system and with increasing oil concentration. The surface tension at the boundary between the aqueous and the hydrocarbon phases decreases with increasing oil percent and with increasing concentration of potassium oleate in the aqueous phase. The curve of surface tension vs ethanol shows a minimum in the range 30-40% ethanol; increasing the oil concentration increases the percentage of alcohol at which the minimum occurs. The surface tension at the air-emulsion interface increases with increasing oil concentration and increasing age of the emulsion. The oil becomes completely tied up with the dispersed phase of the emulsion and forms a separate phase which destabilizes the system. After homogenization stops, the oil separates as an individual layer. Thus, such emulsions are not suited for the preparation of butyl caoutchouc latexes containing oil. References 18: Russian; Tables 1; Figures 5.
[24-12027]

UDC 678.4.033.3:678.743.41-139

NATURE OF RESINS BASED ON FLUORO-CAOUTCHOUC WITH FLUOROACRYLATE POLYMERS

Moscow KAUCHUK I REZINA in Russian No 10, 1980 pp 18-21 manuscript received 2 Jul 80

SEMENOV, G. D., YEVCHIK, V. S., MARKOVA, L. A., and SYSA, V. M., Dnepropetrovsk Branch, Scientific Research Institute of the Rubber Industry

[Abstract] A study was made in order to investigate the possibilities of preparing resin mixtures having a low viscosity and better technological properties by mixing fluoro-caoutchouc with low-viscosity polymers, specifically the acryl esters of fluoroalcohols having the following "R" groups: $-CH_2-CF_2CF_2H$ (compound 1); $-CH_2-(CF_2-CF_2)_2H$ (compound 2); and $-CH_2-(CF_2-CF_2)_3H$ (compound 3). The introduction of the fluoroalkylacrylate polymers (FAP's) decreased the viscosity in direct proportion to the amount added. The degree of decrease followed the order compound 1 > compound 2 > compound 3. The strength under tension also decreased with increasing FAP concentration. The resins with and without the FAP's were similar with respect to the relative stability towards deformation under compression. Thus, resins containing 10-30 mass% FAP have satisfactory elastic parameters and better technological properties for certain applications. References 4 Russian; Tables 2.
[31-12027]

UDC 678.762.2-9-404

STRUCTURE FORMATION OF VULCANIZING AGENTS FOR LOW MOLECULAR CAOUTCHOUC POLYMERS WITH TERMINAL CARBOXYL GROUPS

Moscow KAUCHUK I REZINA in Russian No 10, 1980 pp 15-17 manuscript received 30 May 80

YEVDOKIMENKO, N. M., EBIN, Yu. R., NOSNIKOV, A. F. and BLOKH, G. A., Dnepropetrovsk Institute of Chemical Technology imeni F. E. Dzherzhinskiy

[Abstract] During a study of the title topic, it was established that the functionality of the tertiary amine determined the degree of branching of the polymer chain and the nature of the epimolecular structure of the trimer. The viscosity of the composite increases more rapidly when the tri-functional tertiary amine 2,4,6-tri(dimethylaminomethyl)resocinol (UP-0627) is used than when the monofunctional triethanolamine (TEA) is used. The use of TEA results in a lower degree of cross-linking than that obtained for the UP-0627 and therefore in a greater elasticity, a higher average molecular weight, a higher strength, and a much greater relative elongation. Electron micrographs of polymers show that they have a heterogeneous structure whose character is determined by the nature of the specific tertiary amine used. With the trifunctional amines, large unsymmetrical clusters are formed having a diameter of 600-1000 nm and

containing a large number of epoxide resin fragments. When TEA is used, the clusters are spherical, have a diameter of 50-100 nm, and are uniformly distributed. References 7: 6 Russian, 1 Western; Figures 3; Tables 1.
[31-12027]

UDC 678.762.2-134.352.063.01:539.2

FEATURES IN THE STRUCTURAL FORMATION OF SULFUR VULCANIZING AGENTS FOR BUTADIENENITRILE RUBBERS WITH POLYOXYETHYLENE GLYCOL

Moscow KAUCHUK I REZINA in Russian No 10, 1980 pp 12-15 manuscript received 8 Jan 80

FOMIN, A. G., DONTSOV, A. A., NOVITSKAYA, S. P. and KLOCHKO, V. V., Scientific Research Institute of Polymers

[Abstract] Samples were prepared from several butadienenitriles (BDN) of differing polarities (SKN-18M, SKN-26M, SKN-40M, and SKN-50M) plus a sulfur vulcanizing system: 1.5 parts by weight sulfur and 1 part Captax (a mercaptobenzothiazole rubber accelerator) plus one of the polyoxyethylene glycols (POEG's) POEG-600 or POEG-5000 (0.5 to 7.5 mass %). Both the rate of vulcanization and the strength of the vulcanizing agent increase with increasing monomeric acrylic acid nitrile (ANA) units. The addition of POEG-600 to the rubber increased the vulcanizing rate with respect to pure rubber at low (20%) ANA concentrations but not at the higher (50%) concentrations. The rate vs. ANA-concentration curve for the rubber + POEG-5000 is similar to that of the pure rubber. POEG-600 acts as a surface-active compound in the polar compounds SKN-18 and SKN-26. In contrast to non-polar rubbers, the above rubbers contain polar fragments of the polymerized chains which are stabilized in the micelles by the surface-active components. References 13: 5 Russian, 8 Western; Tables 2; Figures 4.
[31-12027]

UDC (678.762.2-134.352+678.674'443'22).033.3/.063.002.612

STUDY OF THE RUBBER-OLIGOMER COMPOSITION OBTAINED WHEN THE COMPONENTS ARE MIXED AT THE LATEX STAGE

Moscow KAUCHUK I REZINA in Russian No 10, 1980 pp 7-9 manuscript received 19 Mar 80

SHEYKINA, A. N., KUZ'MINSKIY, A. S., ARKINA, S. N. and YADREYEV, F. I., Krasnoyarsk Industrial Rubber Products Plant

[Abstract] The title study was carried out using the oligoetheracrylates (OEA) TMGF-11, TGM-3, 1:1 mixtures of the two, and butadienenitrile-rubber latexes having various amounts of acrylonitrilic acid as a copolymer. The OEA's formed into rubber at the latex stage immediately before coagulation by two methods:

as an emulsion and without an emulsion precursor. An evaluation of the parameters indicated that the introduction of OEA into the latex-rubber significantly influences the physical-mechanical properties of the resins. The OEA obtained via emulsion has greater strength, tension at 100% elongation, and hardness than that obtained without the emulsion precursor. The EPR spectra of the mixed-composition rubbers contain lines characteristic of the "frozen" radicals, e.g., those located in a vitrified matrix. Analogous spectra of the rubbers prepared by the usual method indicated the existence of a microheterogeneous rheological structure. References 3: Russian; Tables 3; Figures 3.
[31-12027]

UDC 541.64:539(2+3)

RELATIONSHIP OF MORPHOLOGY TO MECHANICAL CHARACTERISTICS OF POLYSTYRENE MODIFIED WITH SILOXANE RUBBER

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian No 6, 1980 pp 1399-1403
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[Abstract] Elasticity, durability and other structural properties of polystyrene modified with siloxane rubber were tested using various quantities of unsaturated links to determine bonding and cross-linking. Metallographic procedures were used to evaluate phase structural parameters, and dynamic mechanical losses were measured by a resonance method at about 100 hertz at a temperature range of -50° to +100°. The results showed that a significant increase in the apparent volume of the rubber phase led to a decrease in viscosity due to declining homogeneity of particles in the dispersed phase. The precise cause of this could not be determined because of other parameters that may have influenced the result, but three temperature zones seemed related to dynamic losses: -120° was related to glassification of rubber; -50° - -60° to relaxational pressure in the transitional layer; and 100° to polystyrene stiffening. Figures 3, references 11: 2 Russian, 9 English.
[226-12131]

UDC 541.64:547.427

STRUCTURING OF FLUORINE RUBBER SKF-26 USING PHOSPHORUS-CONTAINING DERIVATIVES OF PENTAERYTHRITOL

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[Abstract] Tests were conducted using unfilled rubber mixes based on SKF-26 rubber containing magnesium oxide as HF acceptor and a vulcanizing agent, by measuring standard specifications, then adding purified derivatives and measuring the infra-red spectra and the nuclear magnetic resonance of phosphorus^{31}. Results showed that structuring of SKF-26 with pentaerythritol *bis*-methylphosphite is an alkylation process following the Arbuzov reaction mechanism and such compounds appeared similar to peroxides, with structures that exceed those of amidophosphites, which have less durability. Thermal breakdown of the samples tested started at 270-280° C; four stages in this destruction are identified. The heat resistance of the vulcanized rubbers tested was greatest for pentaerythritol *bis*-phenylphosphite, followed by a *bis*-methylphosphite and a *bis*-diethylamidophosphite variant. Figures 4, tables 3, references 23: 20 Russian, 3 English. [226-12131]

UDC 678.762.3:542.952.6

OPTIMIZATION OF ISOPRENE POLYMERIZATION CONDITIONS IN A REACTOR BANK

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian No 9, 1980 pp 2021-2026
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SHPAKOV, P. P., ZAK, A. V., PERLIN, B. A., ABRAMZON, I. M. and LAVROV, V. A.

[Abstract] The goal of static optimization in the production of stereo-regular SKI-3 isoprene rubber in parallel banks is stabilization of final parameters (polymer concentration and Mooney viscosity) at specific values, and selection of initial reagent concentrations and quantities (monomer, solvent, hydrogen and catalyst). The optimization process was divided into the following stages: 1) selection of the optimization criterion; 2) formulation of a mathematical model of the process (polymerization reactor) that related initial and final parameters of criterion components; 3) determination of model coefficients; 4) selection of a method for finding the extremum of the optimization criterion. The optimization criterion was the minimum sum of rubber net-cost variable components determined by the polymerization process. The computation programs and algorithms obtained for optimizing stationary polymerization conditions were incorporated into a high-level ASUTP [automated control system for technological

processes] subsystem in a synthetic rubber plant. Optimal process control parameters calculated by an M-4030 control computer are transmitted to the operator for implementation in a "Sovetchik operatora" [operator advisor] system or in a closed circuit to a lower-level subsystem in an M-6000 control computer for regulation of initial parameters in first reactors of a bank. Figure 1; references 4: 3 Russian, 1 Western.
[12-9307]

WATER TREATMENT

UDC 541.18.537+66.067.33

THE COLLOIDAL CHEMISTRY ESSENTIALS OF REVERSE OSMOSIS. THEORETICAL CONCEPTS AND MODELS

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 2, No 3, May-Jun 80 pp 195-206
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[Abstract] Basic theoretical and experimental studies on reverse osmosis are reviewed, including the concept of filtration effect, membrane type, general physico-chemical expressions for component flow and expressions for salt retention in terms of coefficient of filtration, osmotic pressure and flow. The solution and diffusion model is compared to the pore-viscous flow model, since these are the two limiting cases for describing reverse osmosis. The small pore model more closely described the real situation. A great deal of experimental evidence, mostly obtained with modified cellulose acetate membranes, has demonstrated that retention increases with pressure and ion charge and decreases with increasing radius of the unhydrated ion. However, concentration polarization complicated attempts to verify theories experimentally. The charged-membrane homogeneous model characteristic of selective ion-exchange membranes is discussed with reference to three model types: charge fixed on pore walls, homogeneous mix of free and fixed charges and friction effect. Calculations based on a heterogeneous model lead to the conclusion that 98% retention is only possible with membranes having pore sizes of 3 Å, while 90% retention requires 50 Å pores. Expressions have been derived for retention in terms of wall potential, Peclet number and membrane thickness, which agree well with measurements for KCl on bentonite. Adsorption of negative co-ions is the mechanism of electrolyte retention. Retention can be determined by measuring filtration potential and migration of ions into the membrane. References 59: 14 Russian, 45 Western.
[230-12126]

UDC 628.165

TRENDS IN THE DEVELOPMENT OF MEMBRANE METHODS FOR THE DESALINIZATION AND FRESHENING OF WATER

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 2, No 3, May-Jun 80 pp 238-241
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[Abstract] Analysis of CHEMICAL ABSTRACTS for 1975-1978 demonstrates that a great many works on membrane methods for water desalination and freshening were published, with the number growing for each year except 1978. Increasing interest in theoretical studies of electrodialysis and decreasing interest in theoretical questions of reverse osmosis were noted. Cyclic growth and decline in various topics was observed. The overwhelming majority of the publications are from the USSR, USA and Japan. In Japan the number of publications is growing, particularly in electrodialysis, while interest in reverse osmosis in the USSR and electrodialysis in the USA appears to be declining. Results obtained from analysis of SCIENCE CITATION INDEX disagreed with those from CHEMICAL ABSTRACTS due to the incomplete information in the former on Russian journals. The data indicate that unification of the two membrane methods is likely in the future. References 2 Russian.
[230-12126]

MISCELLANEOUS

UDC 621.59.041:661.939.1/621.512

DEVELOPMENT OF HELICAL COMPRESSORS FOR THE COMPRESSION OF HELIUM

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 11, 1980 pp 25-27

SNEPP, V. B., candidate of technical sciences, SHVARTZ, A. I., VERNYY, A. L., engineer, and KARAGANOV, L. T., candidate for technical sciences

[Abstract] The title evaluation was carried out using the helical oil filled compressor 7VKG-27/5 with the electric motor VAO-102-2 with a rating of 160 Kw at 2980 rpm. The air in the system comprised less than 0.1 vol.% of the compressed gas and therefore did not change the compressor characteristics significantly. Analysis of the obtained data on the relationships of output, rating, coefficient of delivery, and isothermal efficiency of the compressor to the degree of pressure increase at different input pressures indicates that they are typical for this type of compressor. As the rate of increase in input pressure grows, both the output and the coefficient of delivery decrease. This is associated with an increase in the relative reaction of the gas which escapes. At the same time, with decreasing input pressure at any rate of pressure increase and amount of injected diffusion pump oil, the coefficient of delivery and output of the compressor increased. Resultant experimental data are close to the calculated values. References 5: Russian; Tables 1; Figures 2.
[32-12027]

UDC 666.1.056:620.197

GRAFTING OF BIOLOGICALLY ACTIVE COMPOUNDS TO THE SURFACE OF OPTICAL MATERIALS

Moscow USPEKHI KHIMII in Russian No 11, 1980 pp 2241-2254

BAYGOZHIN, A.

[Abstract] The protection of surfaces of optical parts of instruments used in the tropics from damage by microorganisms, particularly fungi, is reviewed. Antifungal activity has been achieved by grafting chemosorbed bioactive films that do not alter glass optic properties and contain fungicidal or fungistatic

compounds onto the glass surface. These films are synthesized by applying first an organosilicon compound and then the bioactive substance or only an organosilicon compound that already contains bioactive groups to glass. Films with bioactive atoms bound to the organylsiloxane fragment by ionic, coordinate or polar covalent bonds exhibit fungicidal properties with the polar covalent bond producing the longest active time. The film-forming compounds reviewed include mercury organylsiloxanes, which form 10-15-A-thick films effective for 1.5 years; arsenic organylsiloxanes, among which gamma-(diphenyl-arsinothio)propyltriethoxysilane is the active; organotin(silicon) compounds, e.g., triethylmethacryloxystannane, which can be used on silicate and nonsilicate materials; compounds with Si-O-metal groups, e.g., methoxyethylmercurosilicate, where the metal may be mercury, silver, copper, lead or boron; halogen organylsiloxanes (chlorine, fluorine or iodine); and nitrogenous organylsiloxanes, which are short-term fungicides. The mechanisms of action of these fungicidal films include inhibition of energy-producing and biosynthetic processes, cell membrane permeability disturbandes, as well as action on transport enzymes with sulfhydryl groups and on the orientation of molecules, which affects normal metabolism. Table 1; references 105: 67 Russian, 38 Western. [38-9703]

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